COAL AGE

A McGRAW-HILL PUBLICATION

DECEMBER, 1957

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PRICE $1

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Lafayette Springs Strips, Deep Mines Mountain-Top Seams ... p 58

Here's why the Edison R-4 Double Filament Bulb saves Productive Man-hours— promotes greater underground safety

With the Edison R-4 double filament bulb, a burned-out filament doesn't mean lost time for the miner or a short crew for the foreman. A turn of the switch transfers the power of the unfailing Edison battery to the second filament—restores continued, brilliant illumination. There is only one bulb, located in the center of the headpiece, which gives the advantage of maximum reflector area.

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B.F.Goodrich V belt briefs—

TIPS ON THE CARE, MAINTENANCE AND SELECTION OF V BELTS FOR INDUSTRY

There's danger in replacing just one V belt at a time

When one or two belts in a set become worn or damaged, there's a big temptation to replace just the useless belts. Trouble is that the remaining belts have been stretched through use beyond their original length. The new, shorter belts have to carry most of the load. A severe shock or load strain will easily break these new belts. That's why it's always better to install a matched set of V belts rather than replace one belt at a time. Used belts can be put on a drive requiring a smaller number of belts.

This simple test can increase belt life 50% or more

Maintaining correct tension is one of the most important rules of V belt care. It will give belts at least 50% longer life—often doubles life.

Belts that are too loose will slip, causing both belt and sheave to wear out. If they sag too much, the snapping action caused when motor starts or when peak loads occur can actually break belts in two. ***To test tension,*** press down firmly on each belt. Belts that are properly tensioned will depress an amount equal to their own thickness for each 4 feet of center-to-center distance. For example, if the center-to-center distance is 8 feet, a D-section belt which is ¾ inch thick should depress twice its thickness—1½ inches.

What gives V belts their gripping power?

When a V belt fits properly into the sheave groove, it hugs the pulley side wall, produces its own grip. This high pressure contact is what gives the V belt its pulling power.

Here's why V belts made with straight sides give *extra* gripping power, transmit power better and more efficiently than other types of belts:

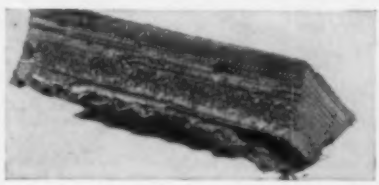
A V belt bends as it wraps around the sheave. The belt sides try to bulge, but the pulley side wall won't let them. As a result, the belt wedges itself tightly into the pulley groove.

To get an idea of how this wedging action happens, try bending a V belt outside of the pulley (as shown in the pictures at right). The bulge you see represents the *force* of this gripping action because the rubber is actually compressed by the pulley walls. This force creates all the pulling power needed for efficient service, yet without any sacrifice of belt life.

Place ruler down side of belt as shown. Ruler lies flat.

Bend the V belt, as it would be around a sheave. Now place ruler down side of belt. It no longer lies flat.

What caused this V belt failure?



Appearance: Slip burn on belt.

Cause: Belt too loose; friction of belt against pulley groove burned rubber.

Prevention: Check tension as described in the first column. Inspect drive for overload and redesign if necessary.

Grommet eliminates cause of 4 out of 5 V belt failures

Unlike other V belts, all the load carrying cords in B.F. Goodrich Grommet V belts are concentrated in twin grommets. These grommets are cord loops made like giant twisted cables except that they're endless. There are no splices or overlaps in this cord—no weak spots to cause premature failure. Since the section where the cords overlap in ordinary V belts is where 80% of the failures occur, this cause for failure is eliminated in B. F. Goodrich Grommet belts. As a result, Grommet belts last 20 to 50% longer, depending on the service (the more severe the service, the greater the increase over ordinary belts).

Ask a factory-trained specialist

For help in selecting V belts for any kind of service, call the man who is a specialist in V belts—your B.F.Goodrich distributor. He can help you cut costs by getting longer life from your V belt drives. *B.F.Goodrich Industrial Products Company, Dept. M-233, Akron 18, Ohio.*

The strain of starting a heavy ball mill and keeping it turning was wearing out ordinary V belts before their time. Then Grommet V belts were tried. Because the B.F.Goodrich V belt is strong enough to pull heavy loads and take sudden jerks, the set shown lasted 6 years —longer than any other V belts used.

B.F.Goodrich

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BIRD-HUMBOLDT ***Screen Centrifugal Dryer***

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► Deep Mining

How Rainbow Contour Mines ..... *p 54*

Louis A. Engstrom, Engineer, Gunn-Quealy Coal Co., Quealy, Wyo.

Return to underground mining after stripping left the problems of a winding pit, faults and thin coal to cope with. As a result, it was decided to complete the recovery with a series of four small mines. A ready market for coarse coal dictated the use of loading machines, which are supplemented by shuttle cars, belts, truck-loading bins outside and truck haulage down the mountain to the tipple, plus roof bolting and drilling with hand-held hydraulic units.

Added starters—Protecting sprinkling lines against freezing; development of the "Middleton wheel" for centering coal on belts at transfer points and elsewhere.

► Strip Mining

Lafayette Springs Strips, Deep Mines Mountain Top Seams ..... *p 58*

By changing from shovels to drags, the Lafayette Springs Coal Co. was able to increase their overburden removal ratio from 1:1 to 16:1. This also made more stripping territory available. A new vertical, rotary drill and a new blasting agent, ammonium nitrate and fuel oil mixture, provide efficient drilling and low-cost blasting. Good recovery of the coal seams is assured by combining deep mining and stripping.

Sidelights—Full description of stripping and deep mine operations.

► Conveyor Haulage

Today's Conveyor-Belt Picture ..... *p 64*

With around 5,000,000 ft of conveyor belt in service, coal stepped its purchase rate up sharply in 1956 and plans increasing use of belt conveyors in the future. Reasons include increasing use of the extensible belt, more production from thinner seams and greater use of belts in stockpiling, preparation and loading on the surface. Average belt life, on the basis of reports to *Coal Age*, is 6.2 yr. The low is 2 yr and the high is 15 yr. Average expenditures for conveyor-belt replacement at mines using it is 1.6c per ton; minimum, 0.5c; maximum, 6.0c.

Sidelight—Major factors in the purchase of conveyor belting.

► Equipment Inspection (Part III)

Inspection Guide for Deep Mine Equipment ..... *p 66*

Daniel Jackson, Jr., Assistant Editor, *Coal Age*

Haulage equipment and other service items are essential to the overall mining setup. They should be inspected frequently to insure good operation. How to go about the inspection and what to look for is the theme of this inspection guide. No maintenance system is complete without good inspections and detailed reports and records.

Sidelights—Inspection form and photos illustrate good maintenance practices.

(Continued on p 7)

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Maintenance Training

ME-MMA Names Maintenance Man of the Year ..... p 72

Trouble formerly requiring 2 hr to two shifts to locate and repair now can be handled in 5 to 30 min. Repairmen now have confidence in themselves and usually are able to locate the source of trouble in 15 min. And mechanics are thinking in terms of preventive maintenance. As a result, the number of breakdowns has been cut considerably. The foregoing are some of the results of a training program taught by J. C. Sweeney for the Duquesne Light Co. For conducting this couse, Mr. Sweeney was named "Maintenance Man of the Year" by the Mining Electro-Mechanical Maintenance Association.

Feature—A description of what is taught in the course and how the material is presented.

Preparation

Flocculation Can Improve Vacuum Filtration ..... p 74

P. S. Jacobsen and **J. E. Mauser,** U. S. Bureau of Mines, Seattle, Wash.

Results of tests on 15 flocculants show that filter capacity can be increased in handling a slurry that is particularly difficult to treat in unflocculated form. The use of flocculants also results in cleaner filtrate which may solve stream-pollution problems for some operators. Among the flocculants tested are causticized starch and the newer synthetic polymers and gums. Effectiveness and cost of the flocculant must be considered in selecting a treating agent for a particular filtering application.

Sidelights—Test apparatus for rating flocculants is shown schematically, and test results are tabulated.

(*Continued on p 11*)

This Month in COAL

OFF ON OUTPUT—Even if business was to take a sharp—and unexpected—upward spurt in the few remaining weeks of 1957 such a spurt could not change the bituminous production picture materially. Consequently, 1957 will wind up around 5 million tons behind 1956, give or take a million or so. Anthracite, after holding its own fairly well for 8 mo., began losing ground at a substantial rate in September, and bids fair to wind up 1957 2 to 3 million tons off—more nearly 3 without a break in the weather in the remaining weeks.

The preceding is expected to be the picture even if the mines remain free to schedule operations for Dec. 24, 26 and 31, which were vacation days in 1956, and for which the miners received $40.

OUTLOOK FOR '58—Since there is so far, little indication of a radical change in the level of business activity in the early weeks of 1958, the bituminous production rate prevailing in the remaining weeks of 1957 will carry over for at least a time. How long it will be before an upturn is being increasingly argued.

Within the industry, there seems to be more disposition to challenge forecasts calling for anything much beyond the present level for the immediate future, in part because competition still remains stiff with no prospect of a major softening, and in part because of the fear of technological changes, such as, direct reduction of iron ore, which would curtail existing markets. But the business level still remains the best bituminous barometer for the immediate future. An upturn could come because of the proposed Eisenhower selling tour, the impact of an enhanced military program, a natural upturn in industry itself, or all three plus other factors. At any rate, most of the experts in economic forecasting expect it before the end of the year and possibly before the end of the first half.

COMPETITION—Coal again took some losses—some of considerable magnitude—from oil and gas in 1957, principally in the railroad and domestic markets, with "Other Industrials" as an added starter. The pressure will remain on in these markets, as well as others, in 1958. There will be further losses in the railroad and domestic markets, though not on the same scale perhaps. If business picks up, the drop should be recovered in "Other Industrials," and consumption should increase again in the utility markets and in other smaller markets, with exports remaining about the same.

Thus, unless competition gets a lot tougher than present signs indicate it can, any improvement in the business climate should result in a net gain for bituminous. Anthracite, on the other hand, must depend upon a high level of exports and a real break in the weather to offset the pressure of competition.

TRANSPORTATION—Indications are that the pressure for raising rail freights will be less in 1958 than for some years past, though some further attempts to obtain small increases are being contemplated and probably will be carried through on. More significantly, the stage has been set by actions in 1957 for the promulgation of additional special rates to retain old markets or open up new, as in the Middle West and from southern mines to Florida last year.

Can profits keep pace with production?

To achieve production goals, you're probably spending more money on new equipment than ever before – an industry-wide total of $1.5 billion between 1955 and 1960. But the fact remains: your profits depend heavily on how efficiently – and how long – your equipment serves you.

Lubrication, performed properly and periodically, can keep your new and old equipment operating efficiently over longer life spans. In the last analysis, it is your most economical method of cutting down-time and increasing tonnage per man shift.

For proper lubrication, use Texaco products. They're made for specific jobs. *Texaco Crater*, for example, keeps wire rope strong longer because it protects every strand, and encloses and seals the core. Its protective film prevents both rust and corrosion – minimizes wear by reducing internal and external friction. You can use it on hoist lines, draglines, slusher ropes. It's ideal, too, for open gears because it stays on the teeth – protects against wear.

Or for the application ease of a spray-on lubricant . . . use *Texaco Crater X Fluid*. It gives both gears and wire rope the same extra protection as regular *Crater*.

Consult your Texaco Lubrication Engineer for help in protecting new equipment during the critical break-in process and in prolonging the life of older machines. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States or write: The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TRIPLE PROTECTION. Here, *Texaco Crater* (1) protects the wire ropes, (2) efficiently lubricates the sheaves and pulleys, and (3) protects the open gears against wear by cushioning shocks and heavy loads.

QUICK, EASY STARTS. *Texaco Olympian Grease* protects mine car wheel bearings against dirt, wear and moisture. It stays in the bearings, insuring easy starts at any temperature.

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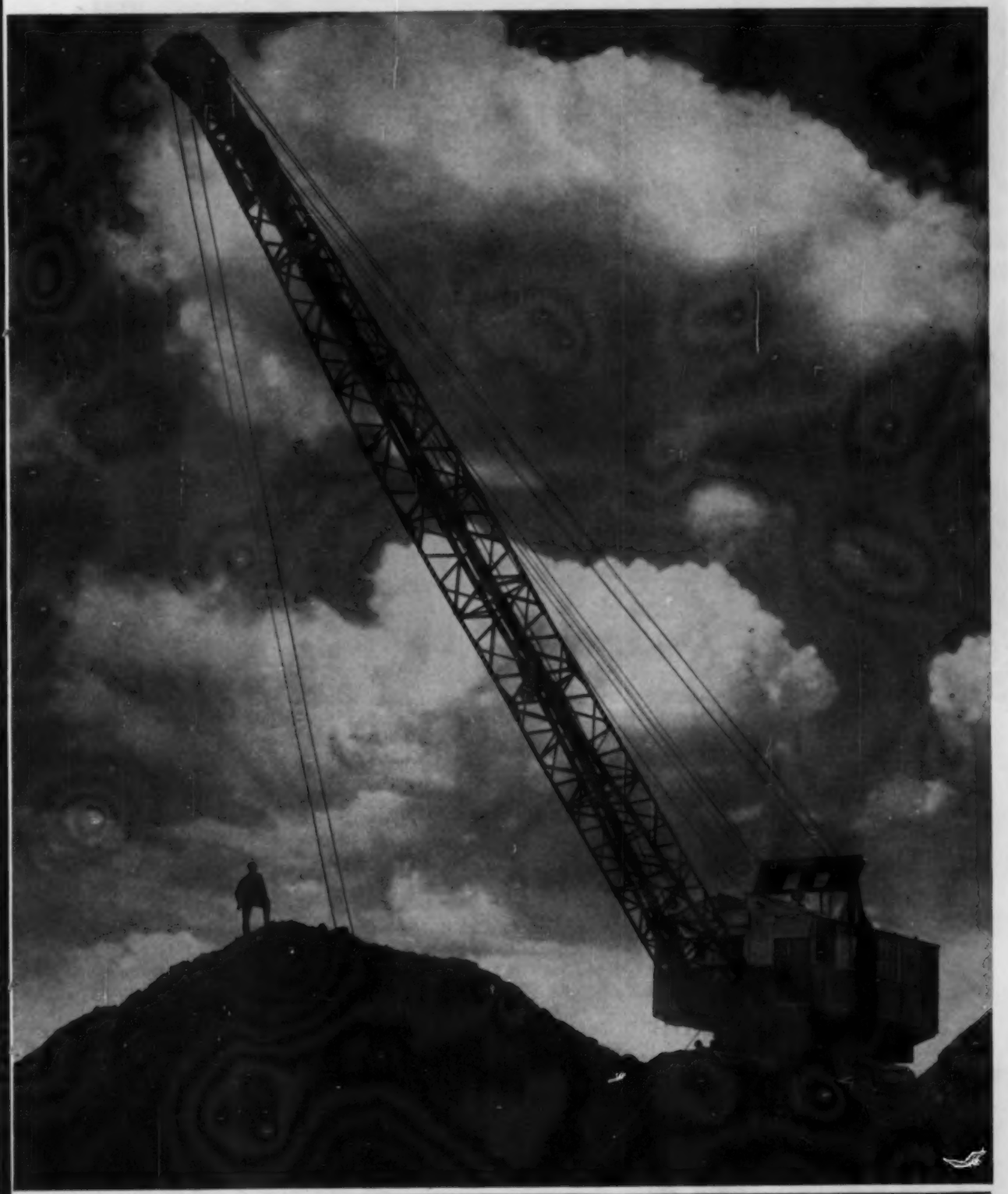

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JALTEN low alloy high-strength J & L steel

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Jalten is available in the forms you require (plates, hot rolled sheets, hot rolled bars, small shapes and structurals). Jalten can be purchased in three grades to meet specific requirements for high strength, formability, impact, resistance to corrosion.

Your local distributor can supply you with information on Jalten, or you can write direct to the Jones & Laughlin Steel Corporation, Dept. 411, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

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This Month in COAL AGE

CONTINUED

Blasting

How to Handle Blast-Damage Problems . . p 76

Stratton Hammon, Vibration Damage Specialists, Louisville, Ky.

Increasing population and increasing awareness of the possibility of large damages in court actions are resulting in a major increase in the volume of blast-damage claims. Successful defense is possible, through heading off the bringing of claims should be emphasized in the conduct of blasting operations. To achieve a successful defense it should be presented by experts and should stress not only the fact that the blasting could not have done the damage, but, more important, that the damage was from other causes.

Question—Whose testimony receives the greatest weight in some courts?

Editorials . . . . . p 53

"Faith and Works"—Coal's year-end position and the outlook for the future.

Coal Commentator . . . . . p 12

Five years ahead; BCI progress; Pittsburgh Coal's subsidence program; cattlenapping from strip pits; natural-gas problems.

Foremen's Forum . . . . . p 92

Get Off the Worry-Go-Round

Operating Ideas . . . . . p 96

Swinging gate replaces overhead barrier—Pressure chamber in sump starts motor—Hydraulic retarder smoothes car feed—Special lubricant boosts gear life.

Equipment News . . . . . p 100

A new rock drill, giant washing machine, steam cleaner, and several types of utility tractors comprise this month's equipment news section, along with a variety of other new items.

News Roundup . . . . . p 124

Crucible Steel Co. of America acquired additional coal reserves; Peru started regular coal shipments to Europe; school children learn about the values of coal; Russia and satellites survey coal stocks.

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The Coal Commentator

Five Years Ahead

Cutter bits made of heat-treated glass.

Dust suppression by the Coanda effect.

Haulage-road conditioning in strip pits by a paper-mill by-product.

Bonding roof with adhesives to supplement or replace timber or bolts for more holding power at lower cost.

Foam generators for knocking down dust at the face and foam plugs for fire-fighting.

Thermoplastic cable insulation and jacket material to make cables really fireproof.

These are some of the things that may—and probably will for most of them—find regular use in coal mining in the future, along with such older ideas as pipeline transportation, fluorescent face lighting, diesel haulage and AC underground, plus 75-yd shovels, 100-ton haulers, 15-in drills and new types of explosives in stripping.

Prophecy: Five years hence, your commentator, and other old-timers, may have difficulty recognizing some of the new materials, equipment and methods that will then be solidifying coal's place as the primary source of energy and carbon-based raw materials.

Gas Problems

Though it might not seem so at times to coal men, the natural-gas industry has its problems too. Those who hold that all is not smooth sailing with this "glamor" fuel now have momentary company, at least in *The Value Line Investment Survey* of Oct. 21, issued by Arnold Bernhard & Co., Inc., investment advisers for New York City. Says the *Survey*:

The natural-gas companies are not faring well . . . During the 12 mo ended June 30, 1957, gas pipeline revenues climbed 10.6% but net income fell almost 2%. Major reason: Outlays for purchase of gas rose 16.7%, indicating that pipelines are having difficulty passing on their higher gas costs to their customers." The *Survey* sees the answer as the "establishment of a satisfactory regulatory climate," and, with a few ifs, expects "some such action in time."

Conclusions: (1) a quick end to natural-gas competition is not in sight but (2) the situation increasingly favors coal, and (3) intensification of cost, quality and merchandising drives can accelerate the swing.

Now Cattlenapping

How far the reclamation and return of strip lands to productive purposes has gone can be judged by many criteria, including one highly unusual standard—the rustling of cow critters from strip-pit herds.

Word of this new development in reclamation comes in the latest news letter from Larry Cook's Ohio Reclamation Association, which has long been one of the leaders in the United States. He notes that an enterprising cattlenapper thought so well of the Hanna Coal herd that he managed to make off with 27 specimens before apprehension.

This should be the final proof, if such were needed, that reclamation has really arrived, thanks to the yeoman efforts of forward-looking, forward-thinking coal men acting in concert with legislators, community leaders, and state and federal authorities. The stripping payoff thus becomes a double one: low-cost energy and a better income off the land.

Sound Progress

"The Bituminous Coal Institute, created a year ago from National Coal Association's Market Promotion Dept., has made sound progress toward the establishment of a better atmosphere for coal, and toward insuring its use in more and more installations." So notes Carroll Hardy, BCI managing director, in reporting on organization progress.

Immediate results? In the first year, more than 4 million tons of new or retained tonnage, which is no small achievement.

Long-term results? Intensification of the trend toward conversion of oil and gas heating and power installations to coal. This trend is definite and is building up. Acceleration, as events to date show, inevitably follows increased merchandising effort and service.

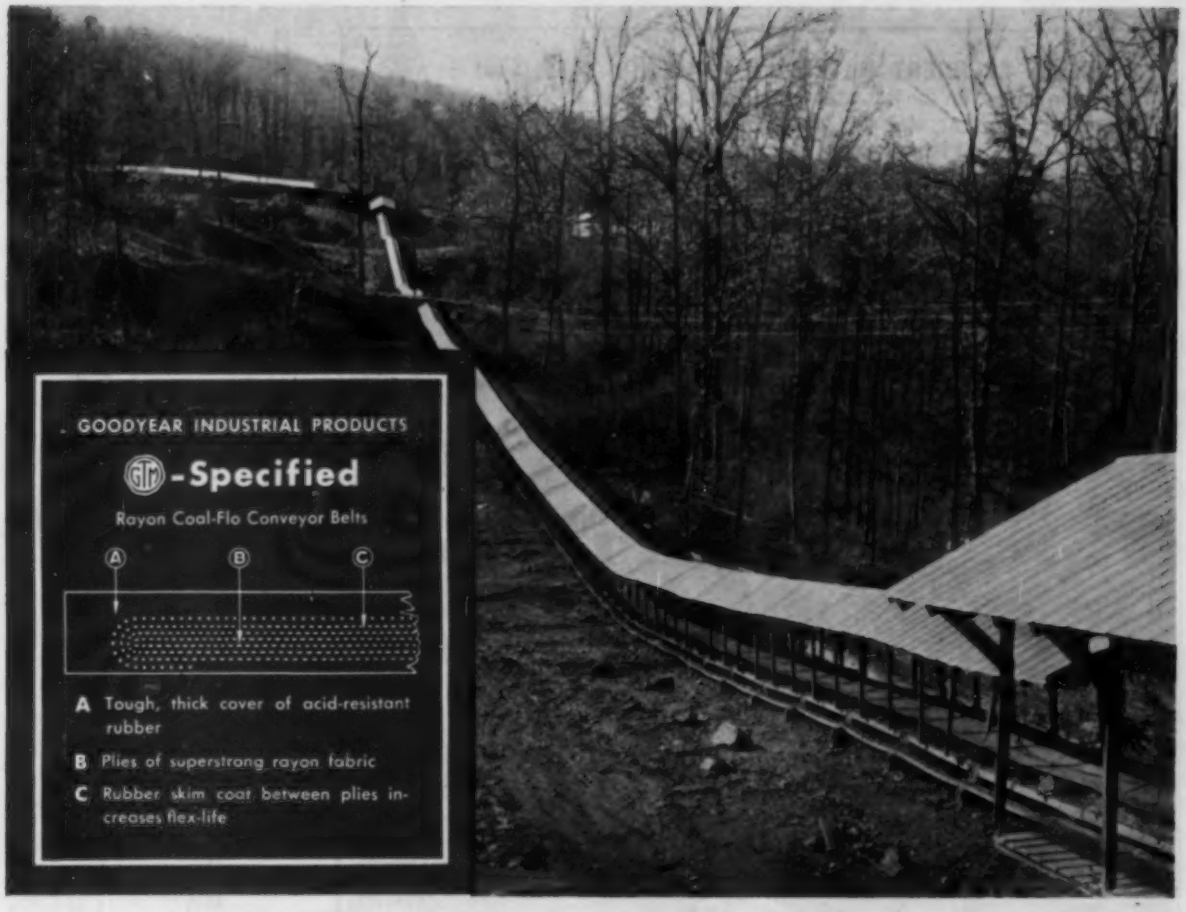
Still needed? Faith that good merchandising methods and engineering service can meet and beat competition, and work in the form of support for and participation in programs to achieve these aims. Ready-made, handy and effective is BCI.

Public Service

"Subsidence—Its Cause, Effect and Prevention" is the title of a pamphlet come to your commentator's desk in November. It formalizes the basic policy of the Pittsburgh Coal Co.

The booklet also aims to provide a clear understanding of the where and how of subsidence, urges property owners and prospective owners to defer construction until mining is completed, and describes how the company can help existing owners work out a satisfactory solution for any subsidence problems that may arise. Where owners have paid for coal support, the pamphlet notes, none of the homes has suffered damage from mine-caused surface subsidence over a period of several years.

Orchids to Pittsburgh Coal for a real public service. Others with similar problems undoubtedly will want to study the Pittsburgh Coal plan.



Saved by the belt: $750 to $1,000 a year

PREVIOUS BELTS were always problems: They stretched excessively. They spilled coal. Fasteners constantly pulled out. Breakdowns were frequent. And one belt failed completely in only a year and a half.

Then this Tennessee mine tried a Coal-Flo belt of super-tough rayon. It's muscled to stand up under rough, tough mine service—designed for excellent troughability.

Results were spectacular: Spillage was virtually eliminated. Repair needs shrank. In fact, this Goodyear belt has now been in service a near-record 9 years—looks as if it might last 9 years more. *And maintenance savings average $750 to $1,000 a year!*

Looking for a belt that can do as well in *your* operation? Just check with the G.T.M.—Goodyear Technical Man. You can reach him—*fast*—through your Goodyear Distributor. Or write: Goodyear, Industrial Products Division, Akron 16, Ohio.

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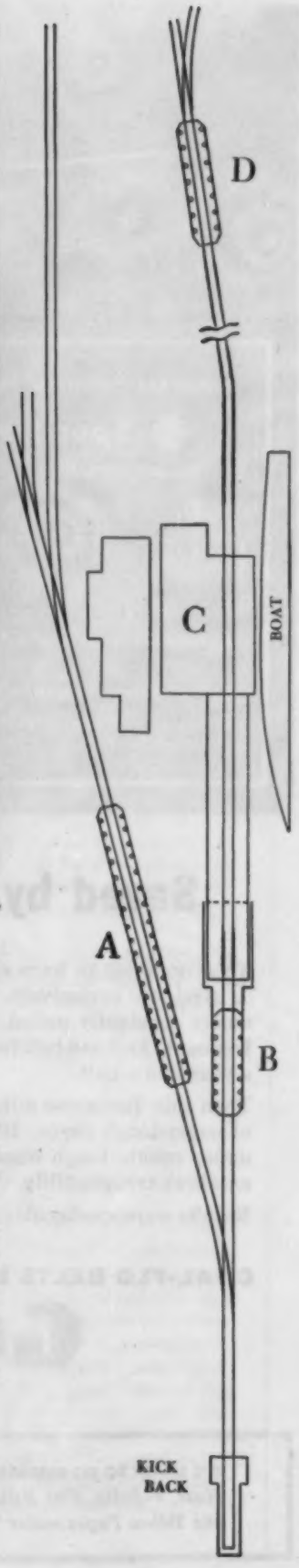
FAST AND EFFICIENT MATERIALS HANDLING—Loaded coal car rolls down the incline on the left at about 15 miles per hour. Its speed is reduced automatically in car retarder (A) so that it rolls up a "kick back" at just the right speed to send it back to retarder (B) where it is stopped automatically. A "barney" then pushes the car up the slope to the car dumper (C) where coal is unloaded directly into the ship. The next full car pushes the empty car off the dumper. It rolls down through retarder (D) to the proper track. All this is done by push-button control.



Automation with UNION CAR RETARDERS cuts costs on coal-loading dock

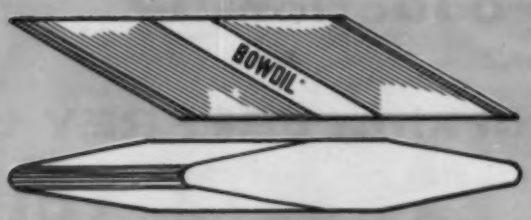
Forty carloads of coal an hour can be loaded on shipboard with this coal-handling system at a Lake Erie coal dock at Conneaut, Ohio.

This job formerly required a crew of men riding the cars and working the hand brakes—a hazardous occupation. Insurance rates were high and frequently men had to wait for the next ship to be loaded.

Now the work is handled quickly and safely by a push-button system using UNION Electro-Pneumatic Car Retarders. Costs have been greatly reduced and hazards eliminated.

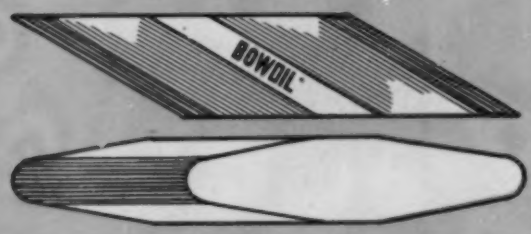
If you have a materials-handling situation involving many carloads of coal, ore or other products, let us show you what can be done with automatic car-retarder systems to increase efficiency and reduce costs. Write for complete information.

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
SWISSVALE, PENNSYLVANIA
NEW YORK ..... PITTSBURGH ..... CHICAGO ..... SAN FRANCISCO



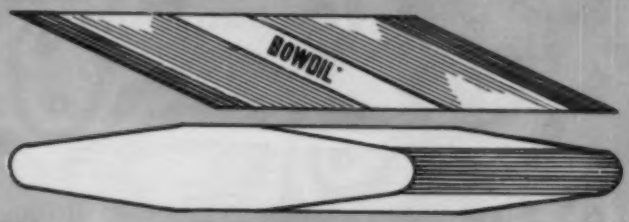
Series 1-1

REGULAR DIAMOND BIT, designed for use where cutting conditions are not too severe. Saves power, produces coarse cuttings. 1-1 is MEDIUM Temper, 1-1N1 TOUGH, 1-1N2 HARD.



Series 1-2

HEAVY DIAMOND BIT is especially designed for severe cutting conditions (Iron Pyrites and Rock). 1-2 is MEDIUM Temper, 1-2N1 TOUGH, 1-2N2 HARD.



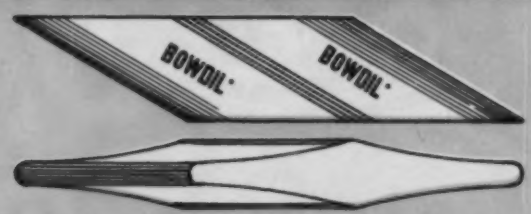
Series 1-6

LONGWALL BIT is especially designed with a long cutting point for Longwall work. 1-6 is MEDIUM Temper, 1-6N1 TOUGH, 1-6N2 HARD.

There's a BOWDIL® Bit for every cutting need!

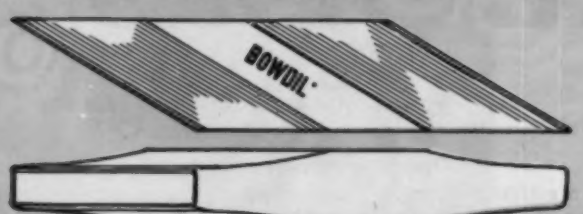
These various types are designed for specific requirements, are made from special alloy steels and are heat treated to three different tempers as listed. Through many years of research on actual conditions in the field, these styles, shapes and hardnesses of Bowdil Bits consistently prove the most popular. We are happy to offer our experience and recommendation for your individual need.

TO HELP YOU RE-ORDER, PLACE YOUR TYPE BIT ON THESE ACTUAL SIZE DRAWINGS



Series 1-11

REGULAR CONCAVE BIT is designed for the maximum in power savings. Due to the concave shape, side clearance is automatically maintained as the face is worn away, resulting in a more uniform power consumption over the full life of the bit. No. 1-11 is MEDIUM Temper, 1-11N1 TOUGH, 1-11N2 HARD.



Series 1-29

HEAVY DUTY CONCAVE BIT has the design features and similar cutting advantages of the Regular Concave, but is made heavier for very severe service. No. 1-29 is MEDIUM Temper, 1-29N1 TOUGH, 1-29N2 HARD.

ORDER BY NUMBER!

THE BOWDIL CO., CANTON, OHIO

Gentlemen: Rush us

_____ NO. _____ BITS
(Quantity)

Name _____

Address _____

City _____ State _____

THE BOWDIL COMPANY

Boylan Ave. S. E. Phone GLendale 6-7176
CANTON, OHIO

push your coal production UP

with this hard-working JEFFREY team

Jeffrey 70-UR Universal Cutter for bottom, top and shear cuts

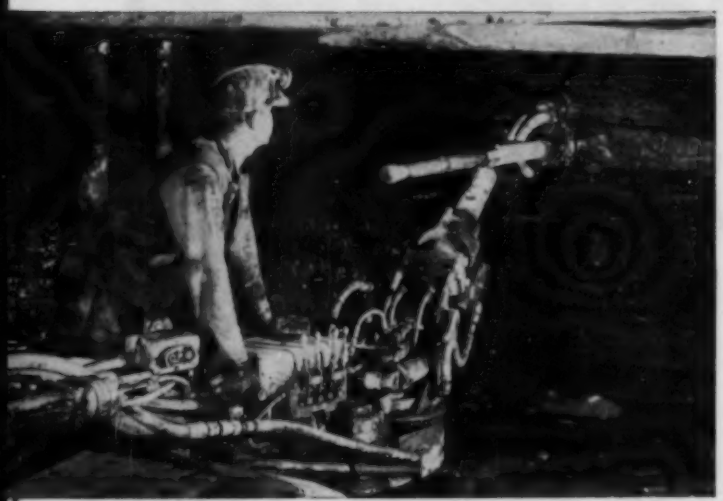
Head and cutter can be rotated 360° in either direction and positioned to make any kind of cut, any place in the seam. From one location, the 70-UR Cutter makes a 30-foot horizontal cut (using a 9-foot cutter bar) or a shearing cut 5'5" to either side of the machine's centerline. No wonder mine superintendents brag about its tonnage-producing ability!

Operators report smooth and positive traction for sumping, even when cutting at extreme range. The 70-UR's wide wheel gauge, long wheel base, low center of gravity and large pneumatic tires give sure-footed stability. Maintenance men say that its rugged construction reduces downtime and cuts upkeep costs.

Jeffrey 81-A Loader for high capacity loading

From both a production and a maintenance standpoint, the 81-A Loader is a superior machine. It is well balanced and flexible, and is easily maneuvered; trams at 137 FPM and can be turned in its own length. The conveyor swings 45° either side of center and elevates properly to load shuttle cars on the straight and in break-throughs. It has a rated capacity of 8 TPM and a maximum capacity of 10 TPM.

Maintenance is simplified on the Jeffrey 81-A Loader because every motor and gear case is a separate, detachable unit. This kind of unit construction is used throughout, resulting in rapid replacements and lower upkeep costs.



Jeffrey 56-FHR Face Drill for shot hole drilling

This single-boom drill provides a high degree of operating flexibility. It is rubber-tire-mounted and self-propelled by two hydraulic motors. Another operates the cable reel. The drilling head can be swung by finger-tip control to any desired position for shot hole placement. Drilling range is 7'2⅜" vertically and 13'1¾" horizontally.

Jeffrey 56-RDR Roof Drill

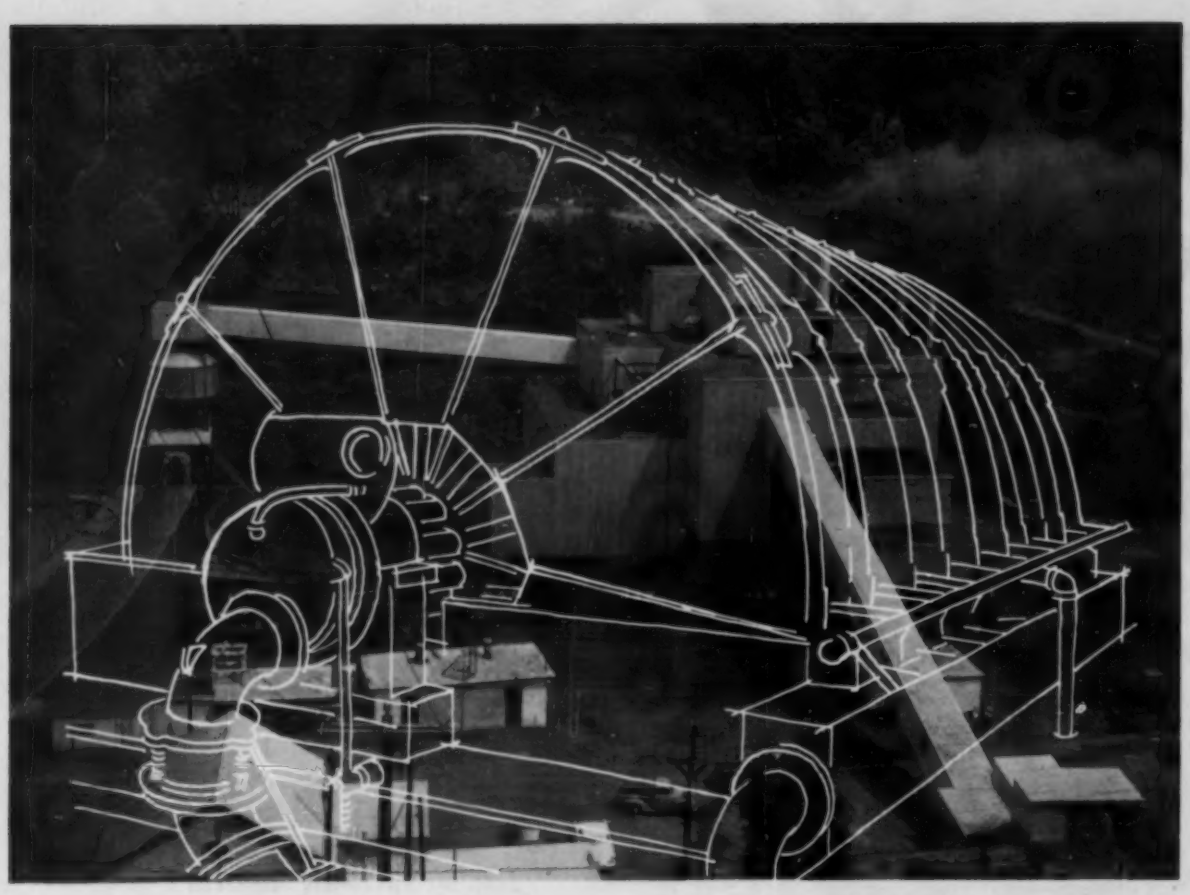
Big, sturdy, easy to maneuver and fast drilling. 10' 9½" arm swing permits a wide room to be bolted from one position. Hydraulic torque wrench assures accurate bolt tightening.

OTHER JEFFREY EQUIPMENT FOR UNDERGROUND SERVICE:

Continuous Mining Machines • Conveyors • Shuttle Cars • Locomotives • Fans and Blowers
Descriptive literature sent upon request. The Jeffrey Manufacturing Co., Columbus 16, Ohio

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING



American Disc Filter

provides positive coal dewatering without circuit fines build-up at Clinchfield's Moss #2

Dante, Va. — At Clinchfield Coal Company's Moss #2 Mine this 10'-6" dia. by 10 disc American Filter installed in the coal cleaning plant is providing positive fine coal dewatering of thickener underflow.

Designed to handle 100 mesh x 0 material containing 72% minus 200-mesh at 35 to 40% solids, the unit will recover 38 tph of fine coal. In addition to providing a filter station which insures exceptionally high capacity per unit area with high solids retention value, the American Disc also delivers a filtrate acceptable for return to the washery system *without build-up of fines.*

Simply stated, the American Disc Type Filter, when applied to a washery discharge clarification and recovery problem, is the best bet yet from both sides of the picture — product recovery and filtrate clarity.

If you have a problem in the recovery of fine coal, chances are a D-O Engineer can be of help to you; or if you would like descriptive literature, write Dorr-Oliver Incorporated, Stamford, Conn.

American T. M. Reg. U. S. Pat. Off.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

FIRTHITE
Blue-Bit
MINING TOOLS
for Lee-Norse MINERS

The Lee-Norse Miner, like all mechanical miners, operates at peak efficiency only when properly tooled.

"Properly tooled" to many Lee-Norse operators means using famous Firthite Blue Bits . . . because of their proved-in-the-mine effectiveness and new design techniques including self gaging shanks and "beefed-up" carbide support areas.

There is a Firthite Blue Bit for your mining condition. Consult the table at right or your Firth Sterling mining tool engineer.

RECOMMENDED TOOL NUMBER	CUTTING CONDITIONS	Coal	Holder
C-7-S	Light to Medium	Relatively Clean	½ x 1
CA-7 CD-7 C-7-M	Medium to Heavy	Occasional Impurities	½ x 1
C-7-S-4 CD-7 CM-7	Heavy	Large Quantities Sulphur Balls, Rock, Rolls, etc.	½ x 1

YOUR AUTHORIZED FIRTH STERLING MINING DISTRIBUTORS HAVE COMPLETE STOCKS FOR IMMEDIATE DELIVERY

R 334

Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

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PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool and Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

Industry's newest shuttle car... powered

by a single Westinghouse motor

National Mine Service Company's "TorKar" powered by a Westinghouse type SK motor sets new standard for shuttle car operation

New performance and maintenance standards have been established by this modern shuttle car design in over four years of actual field tests. A single ac or dc motor supplies all required power for the machine, with a torque converter for protection against overload.

The Westinghouse Type SK motor on this unit is a flange-mounted, totally enclosed fan cooled, Bureau of Mines-Approved, Explosion-proof type, with the extra stamina required to meet rugged mine requirements. Westinghouse design provides for better commutation, longer bearing life, and easy access to commutator and brushes.

Get all the facts about Westinghouse mining motors, both standard and special, by calling your Westinghouse sales engineer. Or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-22051

YOU CAN BE SURE...IF IT'S
Westinghouse

It's easy to see this motor isn't pampered. Dirty, dusty, damp conditions have not been able to stop this 25 hp Westinghouse Type SK motor from delivering its full rated capacity as the single power source for National Mine Service Company's "TorKar."

NOW... THE JOY

STRAIGHT TRAMMING . . . CLEAN BOTTOM

Smooth hydraulic tramming controlled by flow divider distributes power evenly to wide, self-cleaning treads for precise control of straight tramming and turning. Lower trim chain leaves smooth, wide bottom.

EXCELLENT FACE PATTERN . . . GOOD ROOF

Notice how the boring arms and trim chains *break* coal from the face for good size consist. Arched sides and smooth trimming of roof gives good roof control.

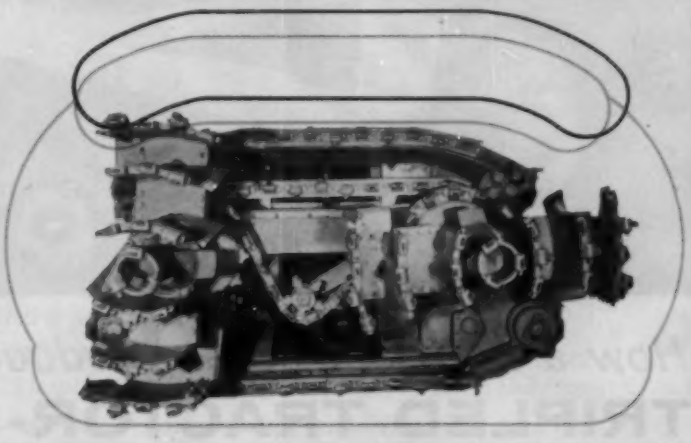
TWIN BORING MINER

advances 2 feet per minute in a 7 foot seam . . . mines 8 tons per minute

EXTREMELY FLEXIBLE

There are two separate trim chains. The photograph shows the machine in the fully contracted position used for tramming. The orange line indicates the expanded position used for mining. The black line shows how the top trim chain may be raised or lowered 12 inches *while mining* for instantaneous control of cutting height to follow any seam.

Two sets of mechanically adjusted boring arms provide boring diameters of 72", 76", 80" and 84". Thus the one machine can be adjusted to meet several mining heights.



WSW CL 6727-107

Here's the Joy full-face continuous miner that does *any* job underground—development work, driving entries, headings, mining rooms and extracting pillars. This versatility is combined with a very high mining rate.

The rate of advance of a full face miner is largely dependent on the weight of the machine and the power driving it. The Joy Twin Borer weighs 40 tons and has a total of 260 horsepower. This weight and horsepower is supported on wide treads so that ground pressure is kept at a low 23 psi. Result . . . unequalled advance through the most difficult seams.

EXTREMELY VERSATILE—Boring pattern is easily changed from 6 ft. to 8 ft. high—from 12 ft. to 13 ft. wide or two other sizes in between. The top cutter chain can be moved 12" up or down *while mining* to follow undulating seams or changing seam thicknesses.

SIMPLE MAINTENANCE—All gear cases, transmissions and electrical controls are mounted on the *outside* of the machine frame. All clutches are the protective slip type.

THESE ADVANTAGES add up to high tons per man and low cost per ton, shift after shift. Talk to a Joy engineer about putting a Joy Twin Borer to work for you. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WRITE FOR BULLETIN 187-1

JOY EQUIPMENT FOR MINING...FOR ALL INDUSTRY

CONTINUOUS MINERS, MOBILE LOADERS, SHUTTLE CARS, COAL CUTTERS, CUTTING MACHINE TRUCKS, COAL DRILLS, CONVEYORS, TIMBER SETTERS, SHUTTLE CAR ELEVATORS, BELT FEEDERS, FANS, BITS, PORTABLE BLOWERS, COMPRESSORS ROCK DRILLS, HOISTS, CORE DRILLS

How a midwest steel producer

TRIPLED TRACTOR-SHOE LIFE

It's "tough-going" in a slag pit! Heavy loads, the grinding impact of abrasive rock and metal, really put tractor shoes to the test. And that's exactly what this steel producer did.

Amsco® cast Manganese Steel Tractor Shoes were installed in place of rolled shoes. The result: *a 3-time increase in service life.* While rolled shoes had previously been replaced after one season's service, the Amsco pads lasted nearly *3½ years—a total of 3374 service hours.*

Here's further proof that Amsco Manganese Steel—"the toughest steel known"—can save you money and replacement time wherever severe impact and abrasion are a problem. Call your nearest Amsco representative, or write us direct, for further information on Amsco Tractor Shoes.

Amsco Manganese Steel Tractor Shoes
In addition to excellent impact and abrasion resistance, Amsco Tractor Shoes have countersunk bolts. This means less wear on bolts, often saves bolt-replacement when changing pads.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS, JOLIETTE, QUEBEC

HERE'S WHY THOSE WHO KNOW PREFER THE *Lee-Norse* MINER

PATTERN CUTTING—*only Lee-Norse has it.*

CUTS MORE COAL WITH LESS POWER . . . *cutters revolve and oscillate at the same time—milling the coal from the face.*

CUTS A COARSE PRODUCT—FEWER FINES . . . *cutter bits follow a right and left spiral direction producing a diamond pattern which breaks off in coarse cuttings.*

A SIMPLE, STURDY MACHINE . . . *essentially a modern loading machine on which is mounted a set of efficient cutting heads.*

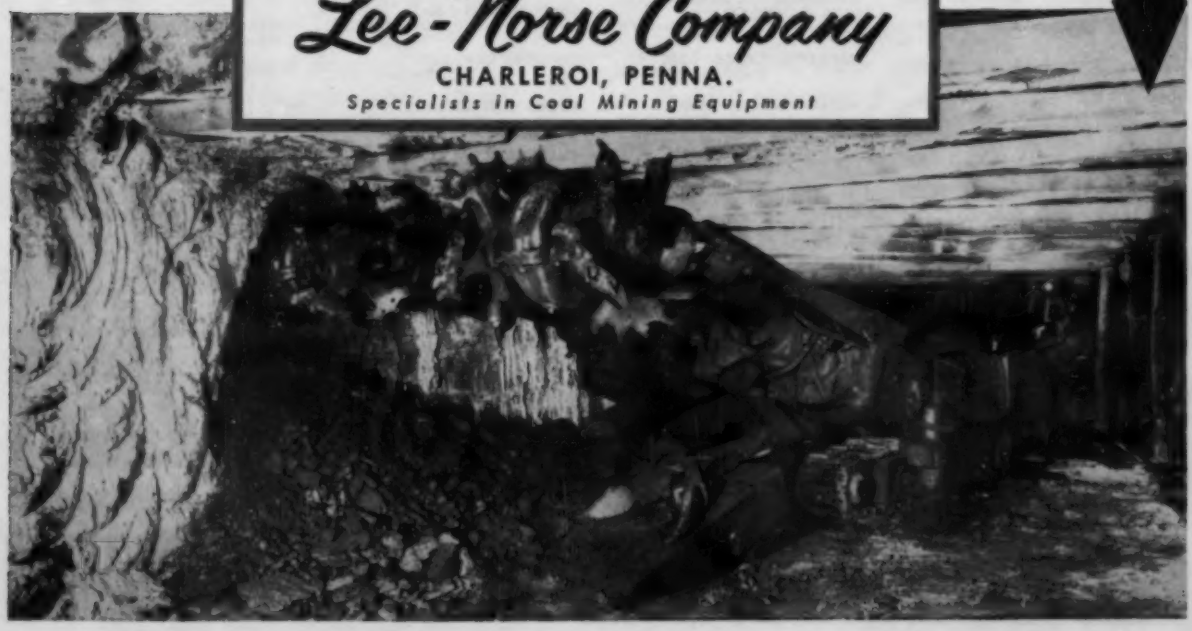
HIGHLY MANEUVERABLE—FAST TRAMMING. . . *not a "muscle-bound giant" . . . it quickly follows any variation in seam thickness.*

EXCELLENT CLEAN-UP . . . *improved dual gathering arms load all the coal into a flexible rear conveyor.*

Lee-Norse Company

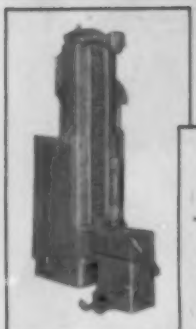
CHARLEROI, PENNA.

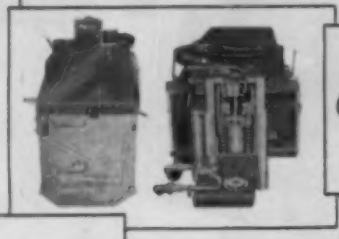
Specialists in Coal Mining Equipment

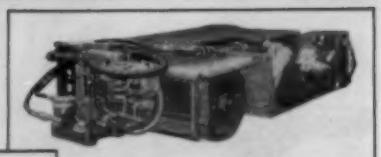


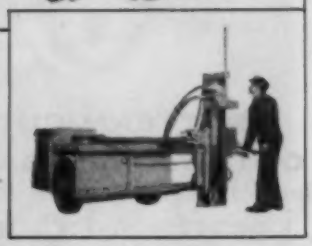
MOST MINES USE Fletcher ROOF CONTROL DRILLS

Tailor-made to do the BEST Bolting Job in ANY Mine!









HERE ARE SOME OF THE OPERATIONS WHERE FLETCHER MACHINES PROVIDE HIGH-CAPACITY LOW-COST ROOF CONTROL

ALABAMA POWER CO., Birmingham, Ala.

ALLEGHENY RIVER MINING CO., Kittanning, Pa.

AMHERST COAL CO., Glenalum, W. Va.

ARMCO STEEL CORP., Montcoal, W. Va.

BAKER COAL CO., Clintwood, Va.

BESTWALL GYPSUM CO., Akron, N. Y.

CHARLES E. CAMPBELL, Bridgeville, Pa.

CANNELTON COAL & COKE CO., Cannelton, W. Va.

THE CARBON FUEL CO., Carbon, W. Va.

CRUCIBLE STEEL CO. OF AMERICA, Crucible, Pa.

CHICAGO, WILMINGTON & FRANKLIN COAL CO., West Frankfort, Ill.

CLEAN COAL CO., Bellaire, Ohio

CLINCHFIELD COAL CO., McClure, Va.

CLINCHFIELD COAL CO., Monterey, Tenn.

COAL PROCESSING CORPORATION, Norton, Va.

COLUMBIA-SOUTHERN CHEMICAL CORP., Midvale, Ohio

CONEMAUGH MINING CO., Seward, Pa.

CROZER COAL & LAND CO., Lynco, W. Va.

CRYSTAL BLOCK COAL & COKE CO., Rawl, W. Va.

DAWSON DAYLIGHT COAL CO., Dawson Springs, Ky.

DUQUESNE LIGHT CO., Greensboro, Pa.

EASTERN GAS & FUEL ASSOCIATES, Pittsburgh, Pa.

EMERALD COAL & COKE CO., Clarksville, Pa.

ENOCO COLLIERIES, INC. Vincennes, Ind.

FEDS CREEK COAL CO. INC., Harman, Va.

FREEMAN COAL MINING CORP., Chicago, Ill.

GRAND RAPIDS PLASTER CO., Grand Rapids, Mich.

GREENSBURG-CONNELLSVILLE COAL & COKE CO., McKeesport, Pa.

HACKER'S CREEK COAL CO., Buckhannon, W. Va.

HARMAN MINING CORP., Harman, Va.

INLAND STEEL CO., Wheelwright, Ky.

INTERMOUNTAIN CHEMICAL CO., Green River, Wyo.

INTERNATIONAL MINERALS & CHEMICAL CO., Carlsbad, N. M.

ISLAND CREEK COAL CO., Holden, W. Va.

JOHNSTOWN COAL & COKE CO., Johnstown, Pa.

KENTUCKY RIDGE COAL CO., Field, Ky.

LAKE SUPERIOR COAL CO., Superior, W. Va.

THE LORADO COAL MINING CO., Lorado, W. Va.

LUMAGHI COAL CO., Collinsville, Ill.

McCANDLISH COAL CO., Meadowbrook, W. Va.

NASSAU COAL CO., Pageton, W. Va.

NATIONAL GYPSUM CO., Clarence Center, N. Y.

NATIONAL MINES CORP., Weirton, W. Va.

THE NEW RIVER CO., Mount Hope, W. Va.

NEW RIVER & POCAHONTAS CONSOLIDATED COAL CO., Capels, W. Va.

OLD BEN CORP., Benton, Ill.

OMAR MINING CO., Omar, W. Va.

PANDORA COAL CORP., Sullivan, Ind.

PECKS RUN COAL CO., Buckhannon, W. Va.

PEERLESS COAL & COKE CO., Bluefield, W. Va.

PITTSBURGH CONSOLIDATION COAL CO., Pittsburgh, Pa.

POCAHONTAS FUEL CO., INC., Pocahontas, Va.

THE POWELLTON COAL CO., Mallory, W. Va.

POWHATAN MINING CO., Powhatan Point, Ohio

RALEIGH WYOMING MINING CO., Edwight, W. Va.

REEVES COAL CO., Clarksburg, W. Va.

RIVERTON COAL CO., Crown Hill, W. Va.

RUSSELL FORK COAL CO., Elkhorn City, Ky.

SAHARA COAL CO. INC., Harrisburg, Ill.

SIMPSON COAL & CHEMICAL CORP., Dawmont, W. Va.

SLAB FORK COAL CO., Slab Fork, W. Va.

STONEGA COKE & COAL CO., Big Stone Gap, Va.

SYCAMORE COAL CO., Cinderella, W. Va.

TRUAX-TRAER COAL CO., Chicago, Ill.

UNITED POCAHONTAS COAL CO., Crumpler, W. Va.

U. S. GYPSUM CO., Oakfield, N. Y.

U. S. STEEL CORP., Pittsburgh, Pa.

THE VALLEY CAMP COAL CO., Moundsville, W. Va.

VIKING COAL CORP., Terre Haute, Ind.

THE WARNER COLLIERIES CO., East Springfield, Ohio

WEST KENTUCKY COAL CO., Madisonville, Ky.

WESTMORELAND COAL CO., Madison, W. Va.

WHITE PINE COPPER CO., White Pine, Mich.

WIND ROCK COAL & COKE CO., (Division of Bessemer Coal, Iron & Land Co.) Oliver Spring, Tenn.

THE Y. & O. COAL CO., Cadiz, Ohio

J. H. FLETCHER & CO. P. O. Box 353, HUNTINGTON 8, WEST VIRGINIA Phone 44186

A Bucyrus-Erie 200-W swings a 6-yd. bucket on a 125-ft. boom as it strips clay, shale and limestone overburden. Exclusive Bucyrus-Erie walking mechanism permits smooth, fast move-ups, easy maneuvering to most advantageous working position.

These mines profited from Bucyrus-Erie Walkers YOURS CAN TOO

The proved ability of Bucyrus-Erie walking draglines to move big yardages at consistently low cost has made them preferred for coal stripping operations everywhere. Why not profit from the experience of others? Choose from the world's largest selection of walking draglines. Contact Bucyrus-Erie Company for full information.

132L57C

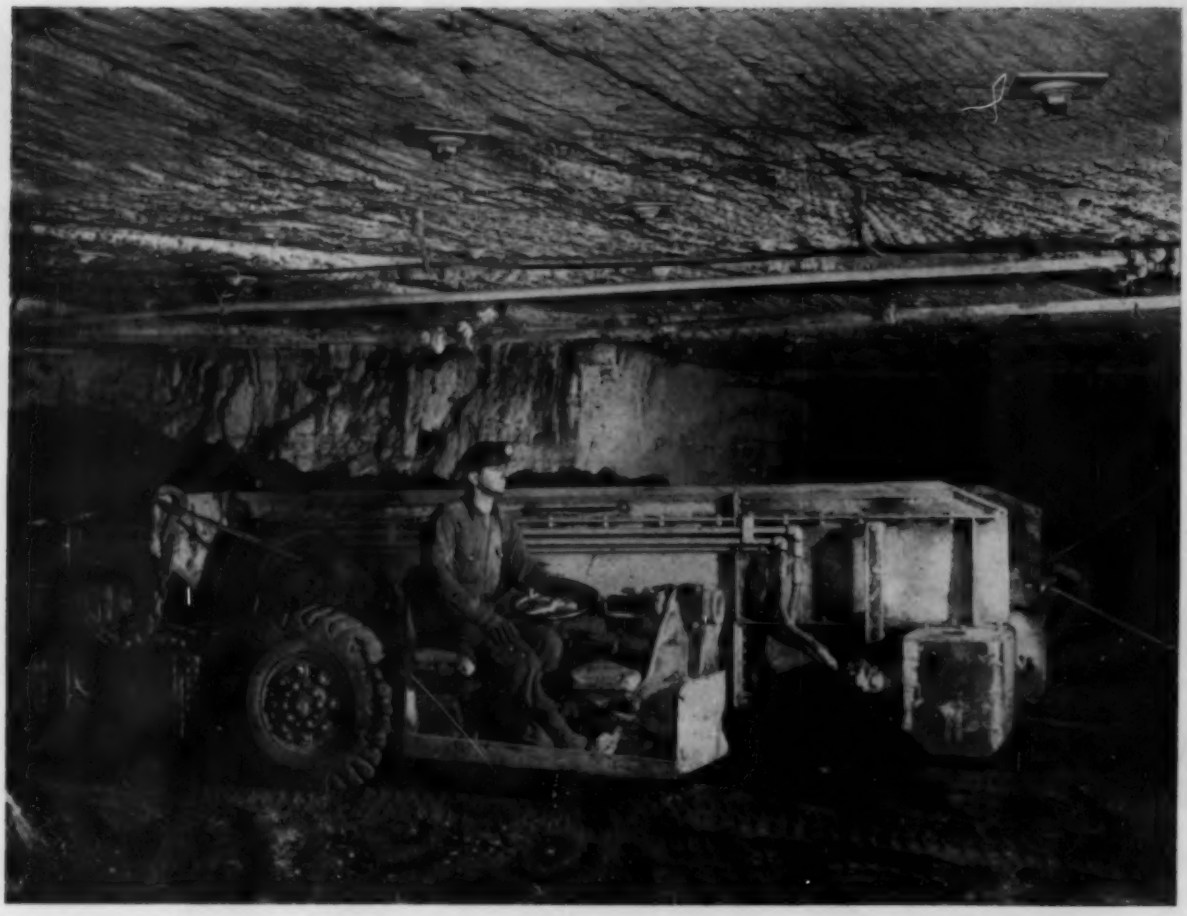
BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

A Bucyrus-Erie 7-W strips clay and rock off of hard coal in Pennsylvania. It is equipped with a 180-ft. boom and a 5-yd. bucket. Modern design keeps front-end weight low to handle big buckets on long booms, concentrate more weight *inside* the bucket as payload.

A Kentucky mine uses this Bucyrus-Erie 480-W for stripping shale, sandstone and dirt overburden averaging 60 feet in depth. The machine handles a 14-yd. bucket on 160-ft. boom. Month after month dependability and low maintenance help assure high-volume, economical operation.



How to bolt your roof...quickly

You can anchor your roof in jig time when you use Bethlehem square-head roof bolts equipped with expansion shells. Simply use your regular drilling equipment and an impact wrench.

Besides saving time, roof bolting does so much to promote safety by locking the overlying rock layers in place. With heavy timbers no longer taking up so much room, it's easier to move mechanized equipment. Ventilation is improved and fire hazards are reduced. And there's less need for large storage areas, both above and below ground.

The Bethlehem square-head roof bolt is used with a leaf-type malleable-iron shell, which is fastened to the leading end of the bolt. As the bolt is tightened in the hole, the leaves of the shell expand, locking the assembly in place. A square roof plate furnishes additional support. A hardened washer reduces friction which may occur between the bolt head and roof plate.

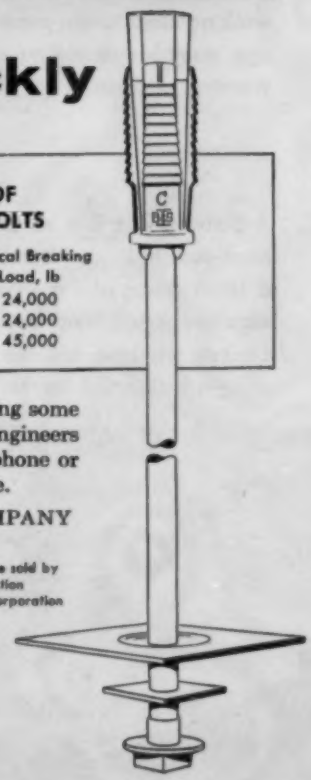
THREE TYPES OF SQUARE-HEAD BOLTS

Type	Diam. In.	Typical Breaking Load, lb
Carbon	¾	24,000
High-Strength	⅞	24,000
High-Strength	⅞	45,000

If you're thinking about doing some roof bolting, let one of our engineers give you full details. Just phone or write our nearest sales office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

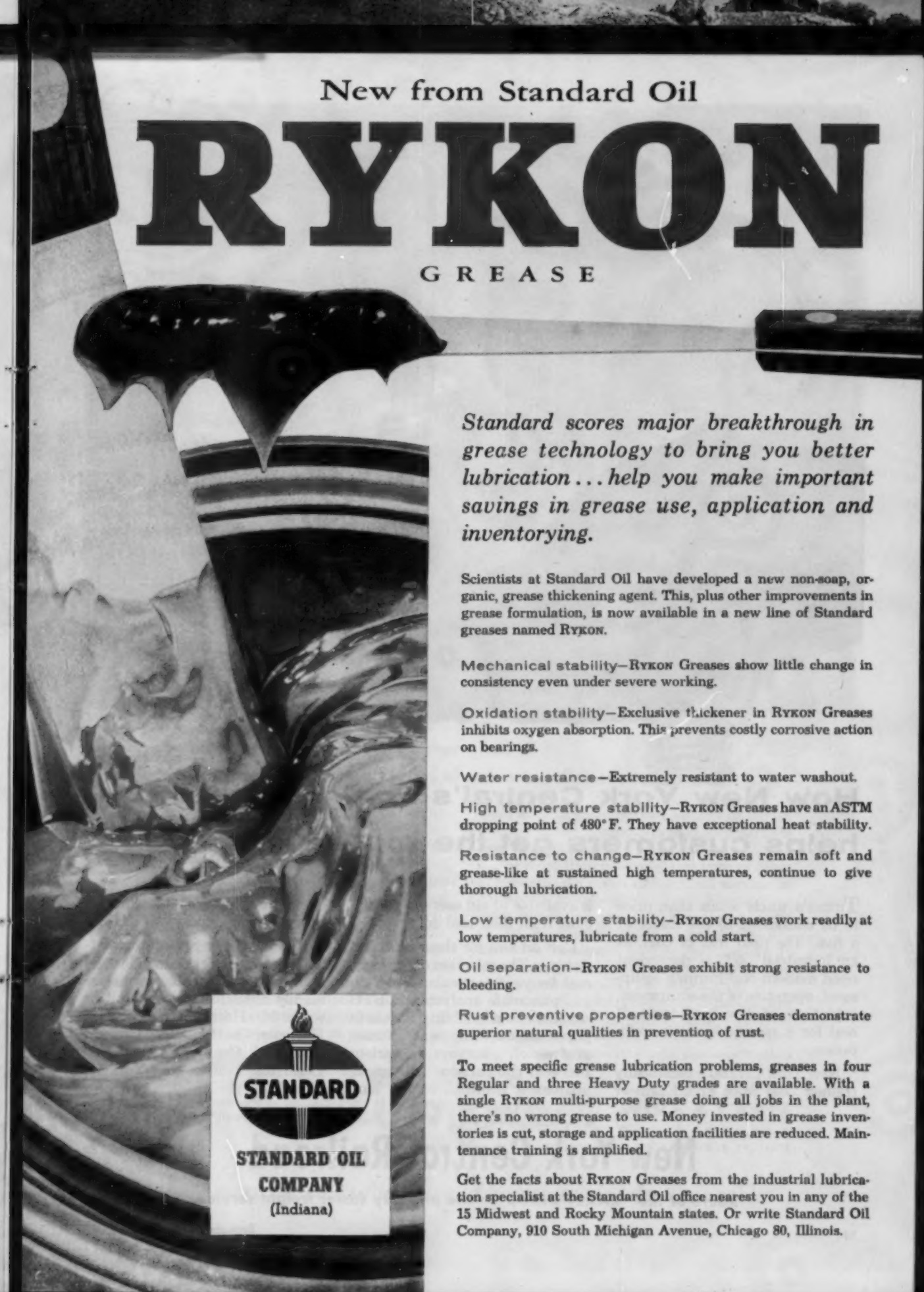


BETHLEHEM STEEL

New from Standard Oil

RYKON

GREASE



Standard scores major breakthrough in grease technology to bring you better lubrication... help you make important savings in grease use, application and inventorying.

Scientists at Standard Oil have developed a new non-soap, organic, grease thickening agent. This, plus other improvements in grease formulation, is now available in a new line of Standard greases named RYKON.

Mechanical stability—RYKON Greases show little change in consistency even under severe working.

Oxidation stability—Exclusive thickener in RYKON Greases inhibits oxygen absorption. This prevents costly corrosive action on bearings.

Water resistance—Extremely resistant to water washout.

High temperature stability—RYKON Greases have an ASTM dropping point of 480° F. They have exceptional heat stability.

Resistance to change—RYKON Greases remain soft and grease-like at sustained high temperatures, continue to give thorough lubrication.

Low temperature stability—RYKON Greases work readily at low temperatures, lubricate from a cold start.

Oil separation—RYKON Greases exhibit strong resistance to bleeding.

Rust preventive properties—RYKON Greases demonstrate superior natural qualities in prevention of rust.

To meet specific grease lubrication problems, greases in four Regular and three Heavy Duty grades are available. With a single RYKON multi-purpose grease doing all jobs in the plant, there's no wrong grease to use. Money invested in grease inventories is cut, storage and application facilities are reduced. Maintenance training is simplified.

Get the facts about RYKON Greases from the industrial lubrication specialist at the Standard Oil office nearest you in any of the 15 Midwest and Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

How New York Central's Fuel Engineer helps customers get the most out of coal

THERE'S MUCH MORE than price to be considered in the choice of a fuel. The final cost of coal, as an industrial fuel, is dependent upon modern coal-burning equipment, operation of the equipment, selection of the best type of coal for a specific burning application.

New York Central's technically trained Coal Sales Fuel Engineer is available to aid users to get the most from their coal dollar.

Call on him for these technical services: The selection of the right coal for your particular firing job . . . proximate analysis and BTU content . . . grindability for use in pulverization equipment . . . fusion analysis . . . surveys on various fuel cost comparisons . . . smoke abatement control . . . ash handling problems . . . handling of frozen coal . . . stockpiling of coal.

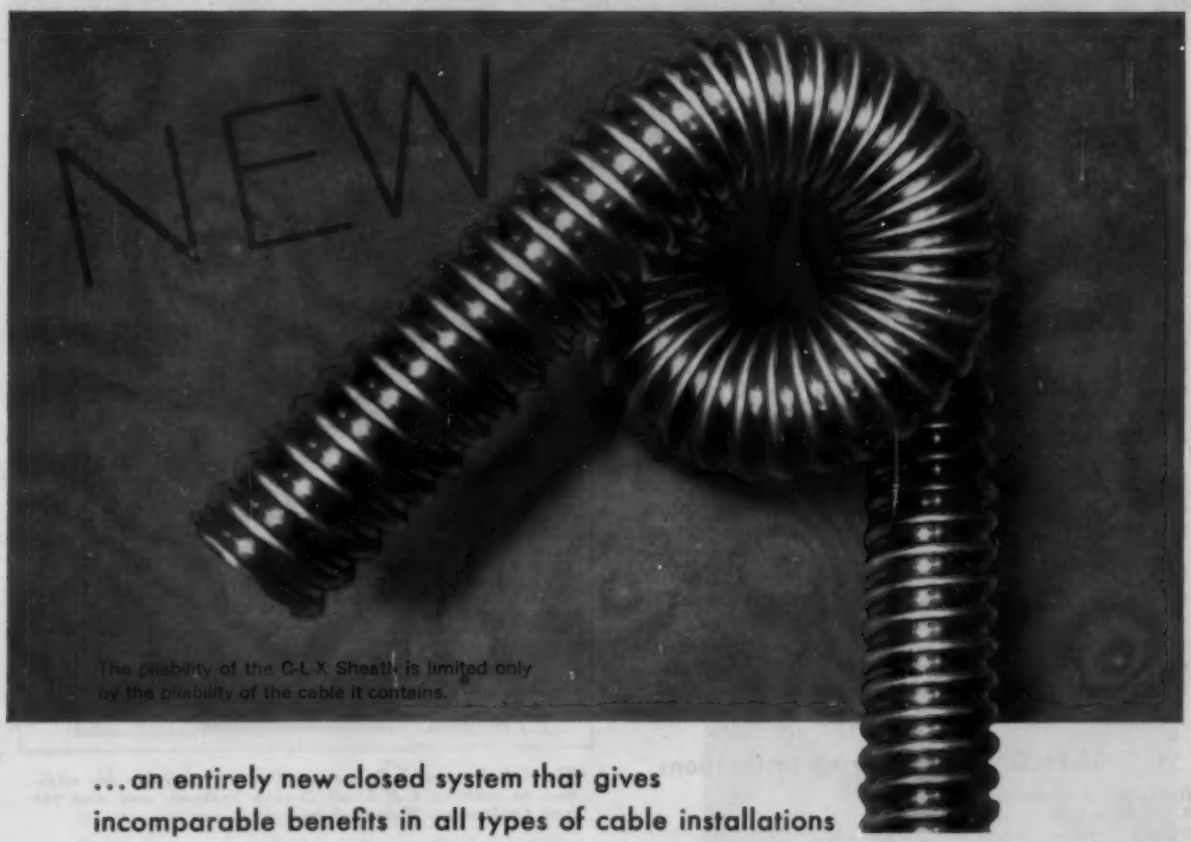
If you burn or are contemplating burning coal as an industrial fuel, the services listed above are readily available to you. Call or write: Mr. Harry A. Klester, Fuel Engineer, Coal Sales Department, New York Central Railroad, 466 Lexington Avenue, New York 17, New York.

New York Central Railroad

Route of the "EARLY BIRDS"—the one-day faster freight service

Simplex

ANNOUNCES the C-L-X* Sheath



...an entirely new closed system that gives incomparable benefits in all types of cable installations

Simplex C-L-X is a Continuous Lightweight eXterior metallic sheath that is impervious to gases, chemicals and water. Its unique construction gives it a combination of properties that is unmatched by any cable system now manufactured in the United States.

C-L-X provides a completely sealed conduit — with "built-in" cable. C-L-X combines all the advantages of lead sheathed and interlocked armored cables. In addition, it has its own intrinsic qualities of great strength with extremely light weight. It is suitable for installation in trays or by clamps. C-L-X can be used aerially or buried directly in the ground. Its pliability permits ease of installation.

For more than a decade, this type of cable protection has given exceptional service in European installations. *Now, Simplex engineering has adapted C-L-X so that its scope of industrial applications is practically unlimited for modern American installations.* It is unequalled in situations where impermeability and durability are important.

Like all Simplex products, C-L-X is engineered for lasting quality and, therefore, *dependability.* Write for specific product data.

*(Continuous Lightweight eXterior, pronounced "Soalex")

LIVE BETTER ELECTRICALLY

Simplex WIRE & CABLE COMPANY
79 SIDNEY STREET, CAMBRIDGE 39, MASS.

"the American manufacturers of transoceanic telephone cables"

C-E RAYMOND DEDUSTING SYSTEM

an important feature in the Flash Drying of Fine Coal

The prime function of the Dedusting Unit is to remove the maximum amount of dust from the dried coal and burn the ultra-fines in a furnace to supply the heat for drying.

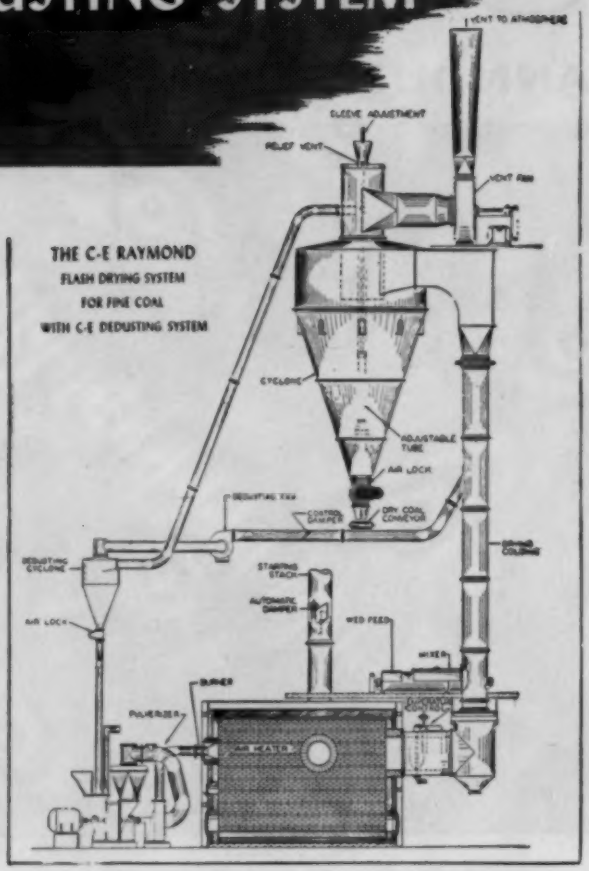
This provides a simple and effective method of handling two troublesome problems:

1. Vent loss to atmosphere
2. Loading nuisance

It has been shown that the vent loss from the cyclone is all minus 200-mesh material. This may be only ½ of 1% or less, yet it causes objectionable pollution in congested areas. Often this fraction is high in ash, and therefore tends to degrade the final product.

In drying the coal to the desired 3% moisture content, the tendency is to over-dry the ultra-fines, creating clouds of dust at all transfer points.

How efficiently the Dedusting Unit overcomes these difficulties is proven by tests conducted in some of the installations below. For example, the records show that where the feed averages 8.2% through 325-mesh, the finished dried coal product is only 1.3% of this nuisance material.



The C-E Raymond Dedusting Unit is available for addition to existing C-E Flash Drying Systems, and also for new equipment. Write for pamphlet.

C-E RAYMOND Coal Drying Installations

Rochester & Pittsburgh Coal Co.
Kent Mines, McIntyre, Pa. (55)*
Hanna Coal Co., Piney Fork, Ohio (40)
Luzerne County Gas & Electric Corp.
Hunlock Power Sta., Kingston, Pa. (50)
Rochester & Pittsburgh Coal Co.
Lucerne Mines, Homer City, Pa. (175)
Island Creek Coal Co., Delbarton, W. Va. (65)
Drisco Company, Library, Penna. (42)
Kuesel Coal Company, Milwaukee, Wis. (15)
Eastern Gas and Fuel Associates
Wharton, Boone County, W. Va. (57)
Blue Diamond Coal Co., Leatherwood, Ky. (75)
Island Creek Coal Co., Delbarton, W. Va. (60)
Black Star Coal Corp., Alva, Ky. (60)
Hanna Coal Company, Adena, Ohio (160)
Red Jacket Coal Corp., Coal Mountain, W. Va. (40)
Clinchfield Coal Co., Dante, Va. (180)
Valley Camp Coal Co., Triadelphia, W. Va. (50)
Harmar Coal Co., Harmarville, Pa. (120)
(Formerly Consumers Mining Company)
Jamison Coal & Coke Co., Farmington, W. Va. (157)
Red Jacket Coal Corp., Red Jacket, W. Va. (70)
Eastern Gas & Fuel Associates
Wharton, Boone County, W. Va. (60)
Mitsubishi Mining Co. Ltd., Namazuda, Japan (10.7)
United States Dept. of Interior
Bureau of Mines, Morgantown, W. Va. (1.6)
Island Creek Coal Co., Mine #6 Bartley, W. Va. (120)
Pittsburgh Consolidation Coal Co.
Pipeline Project, Cleveland Electric
Illuminating Co., Eastlake, Ohio (203.2)
Consolidation Coal Company, Mine #93
Fairmont, W. Va. (200)
Jewell Ridge Coal Company
Tazewell, Virginia (68)
Bethlehem Steel Company for
Erie Mining Co., Emco, Minn. (36.5)
Carbon Fuel Co., Carbon, W. Va. (60)
Consolidation Coal Co., Jamison-Loveridge Mine,
Fairview, W. Va. (400)
Island Creek Coal Co., Mine #28,
Argonne, W. Va. (100)
Omar Mining Co., Omar, W. Va. (176)
Amherst Fuel Co., Slagle, W. Va. (190)
**Tons of dry coal per hour*

COMBUSTION ENGINEERING, INC.
Raymond Division

1315 North Branch St.
Chicago 22, Illinois

Sales Offices in Principal Cities

Combustion Engineering-Superheater Ltd., Montreal, Canada

new

from

Ingersoll-Rand

5-708 ♥ 11 Broadway, New York 4, N. Y.

It's the sensational

VACUJET ROOF BOLTING DUSTLESS STOPER

with built-in JET SUCTION
and PRESSURE DISCHARGE

In the new RP38E VACUJET dustless stoper, Ingersoll-Rand has perfected the first practical solution to the problem of dust control for roof bolting and other up-hole drilling operations. It's the *only* stoper that offers you all these important advantages.

Strong Suction Power — vacuum-producing jet ejector built into drill backhead. Can even drill horizontal holes!

Dust Discharged Under Pressure — to a distance of up to 25 ft from drill. Uses ordinary air hose.

Low-Cost Dust Collector — a simple filter and receptacle is all that's required. Even a canvas bag will do.

Quieter Operation — no unnecessary ear-splitting whine or howl in dust collection.

Highest Drilling Speed — because stronger vacuum and larger dust ports assure non-clogging operation.

Lower Bit, Rod and Shop Costs — tapered bit and rod connections eliminate need for furnaces, threading and forging equipment.

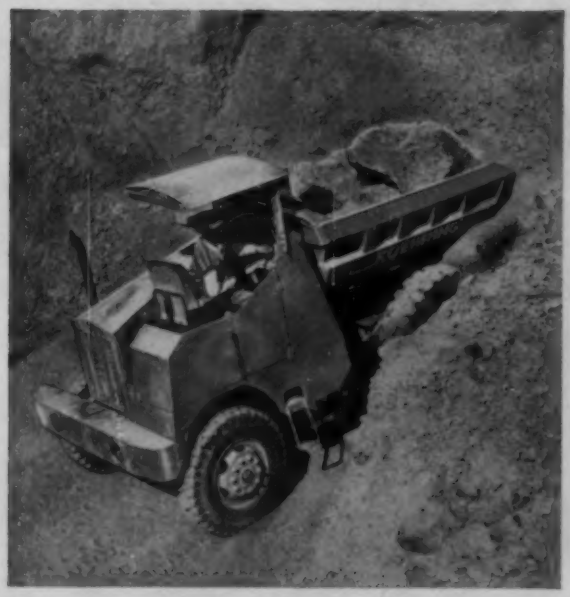
For the complete story on this revolutionary new VACUJET stoper, call your I-R man or send today for Bulletin No. 4195.

COMPRESSORS • CARSETS BITS • ALLOY RODS • HYDRA-BOOM JUMBOS
HOSE • JACKDRILLS • IMPACTOOLS

MINING WITH DUMPTORS

...in open pits...and underground

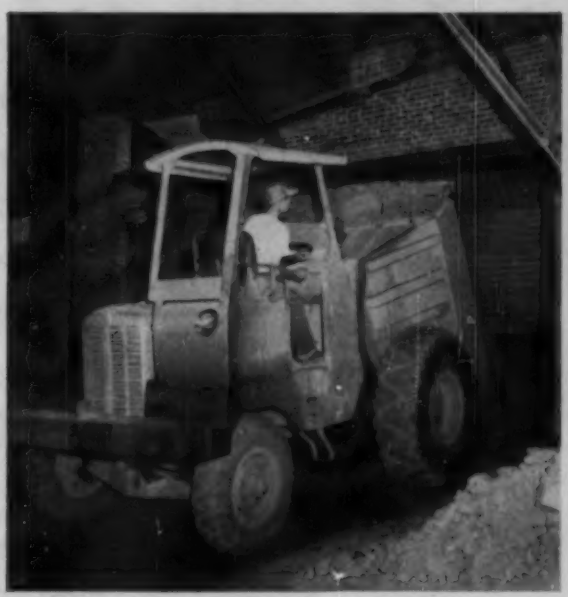
Follow Koehring Dumptor through a typical load-haul-dump cycle, and you'll quickly see why it has gained such wide acceptance on all kinds of mine hauling, stockpiling, feeding hoppers, etc. First, notice how it saves time at the loader (above). Wide-flared 6-yard body, with low height, provides a big square target — *64 square feet, to be exact* — for loading over either side or end by shovel, dragline or front-end loader. On the haul, Dumptor travels at the same speeds in either direction. *There's no need to turn* — an important advantage when working along narrow ledges, overhead trestles, tunnels, etc. It accelerates fast, climbs 24% ramps or grades with capacity load. That's because there's better than 6 H.P. of *"go"* for every ton of loaded weight. At the dump area, *gravity* tilts the body, dumps the load *in one second*. There's no 15 to 25-second wait for slow-acting mechanical body-hoist — and no expensive hoist maintenance, because *gravity-dump* never balks, never wears out. You get all these advantages *and more* when you haul with heavy-duty Dumptors. See your local Koehring distributor about a demonstration, or write to us for the latest Dumptor® catalog.



Up-grade all the way — Near Mexico, D.F., 3 Dumptors haul rock and sand 600 feet up-hill from mine to hopper. In spite of steep, winding road, and normal loading delays, each Dumptor averages 150 loads per 12-hour day. These heavy-duty, 6-yard haulers, with their high ratio of H.P.-to-weight, can climb mine grades as steep as 24% fully loaded.

Dump time: 1 second — At hillside hopper, Dumptor drives up, body forward. Operator trips a body-release lever, and *gravity* tilts the body — dumps the load instantly. Free-swinging kick-out pan breaks load suction for fast, clean dump when hauling wet, sticky materials — bolts down to floor of dump body when handling heavy boulders like this.

Shuttles underground — There's no room to turn in this mine tunnel, and no need to turn. Koehring Dumptor drives up, gets its load, then shuttles back out of tunnel at the same speed as it entered. It operates with equal ease and speed in either direction — is as efficient underground as it is on inclined ramps, overhead trestles, or hauling on the surface.



An inside job — To save rehandling of materials, 2 Dumptors haul clay from pit to processing plant, dump directly into hoppers inside the plant. Convenient end-dump, and no-turn shuttle hauling are especially practical on operations like this, eliminate turning and spotting in crowded work-areas. Handy, too, for stockpiling, and loading rail cars.

KOEHRING DIVISION OF KOEHRING COMPANY • Milwaukee 16, Wis.

HEAVY — RUGGED — POWERFUL

Auger at LOWEST Cost With a McCARTHY Coal Recovery Drill

SELF-MOVING FROM HOLE TO HOLE

FINGER-TIP CONTROL

Gives Desired Rotating Speed Of Auger

HYDRAULIC FEED

Provides Any Speed Up To 6 Feet Per Minute Horizontal Feed Of Drill

Today's increasing demand for coal and the low operating cost of McCarthy Coal Recovery Drills is a profitable combination.

Two men operate the drill augering 70 to 90 tons of coal per hour with the McCarthy Model 1436—42x12 ft. drill pictured above. Holes are 42" in diameter; 144 ft. deep. This drill is equipped with McCarthy Safety Auger Guide which directs auger into coal seam without any climbing or jumping of auger.

Twelve different models of McCarthy Coal Recovery Drills mine this low-cost "bonus coal." Auger diameter ranges from 16 in. to 42 in.; auger sections are 6 ft., 12 ft., or 24 ft. long.

A new auxiliary conveyor—at the boring end—eliminates spillage at the hole. It operates from either side of the drill. This permits working right to the end of a blind cut. When the cut is open at both ends, it permits working from the side nearer to access roads, saving time and mileage for the trucks.

Contact your nearest Salem Tool Co. distributor, or write for Bulletins M-101 and M-102 for detailed information on the complete line of McCarthy Coal Recovery Drills.

MANUFACTURERS OF DRILLING EQUIPMENT SINCE 1901

THE SALEM TOOL CO.

763 SOUTH ELLSWORTH AVENUE · SALEM, OHIO, U. S. A.

THE FUTURE BELONGS TO THOSE WHO PREPARE

For Know-how Ask the

Plant additions represent a big plus for operators these days. Existing plants can produce additional profits by recovering fine coal. This can now be done automatically and efficiently with a McNally Pittsburg plant addition specially engineered to *your* requirements.

This is what the Badger Coal Co., Philippi, West Virginia, is doing. Here, a 250 tph McNally Pittsburg plant built around a McNally Tromp Bath has been in operation for some time. It has efficiently handled all operations, including the loading of 2″ x 0″ fuel.

The inset shows the addition which will recover the fine fuel. Heart of this addition is the new McNally Fine Coal Jig which has proved so efficient in McNally Laboratory tests and in actual service. Here it handles 75 tph of 3/16″ x 0″ coal. Thickening, cleaning, screening, dewatering, and drying in a centrifugal dryer are carried on automatically and the fine fuel is delivered to the loading out tracks.

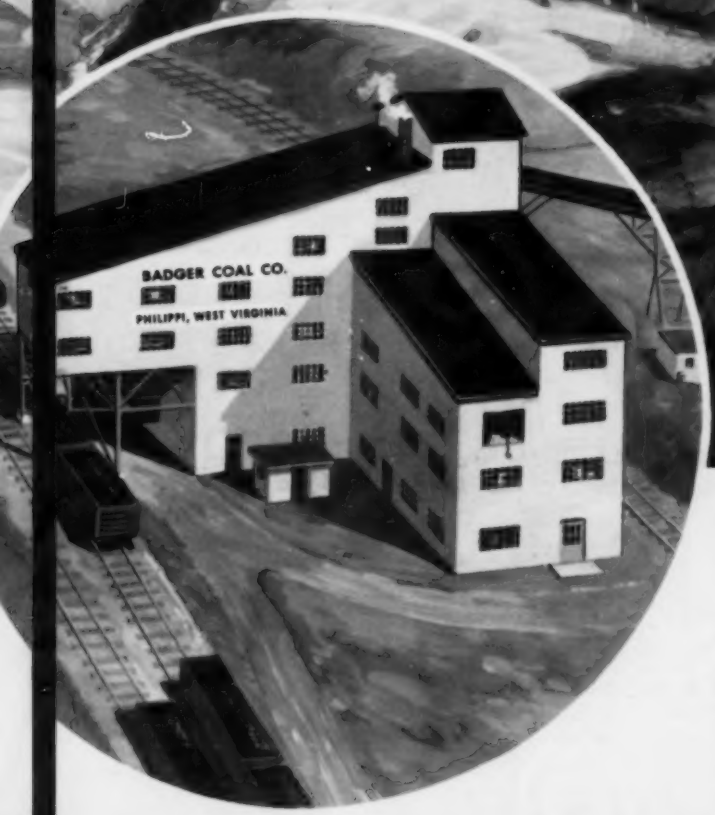
For *your* plant addition McNally Pittsburg can promise amazing new efficiency—why not investigate. Send the post card today.

Men from McNally Pittsburg

Achievement
+ Plus +

Badger Coal Co.

PHILIPPI, W. VA.



Gentlemen:

We need information on a complete new plant or addition that will wash_____inches by 0 at _____tons per hour and dry_____inches x 0 at_____tons per hour.

Send information on the following special equipment:

☐ **The McNally Fine Coal Jig.**

☐ _____

Name_____ **Title**_____

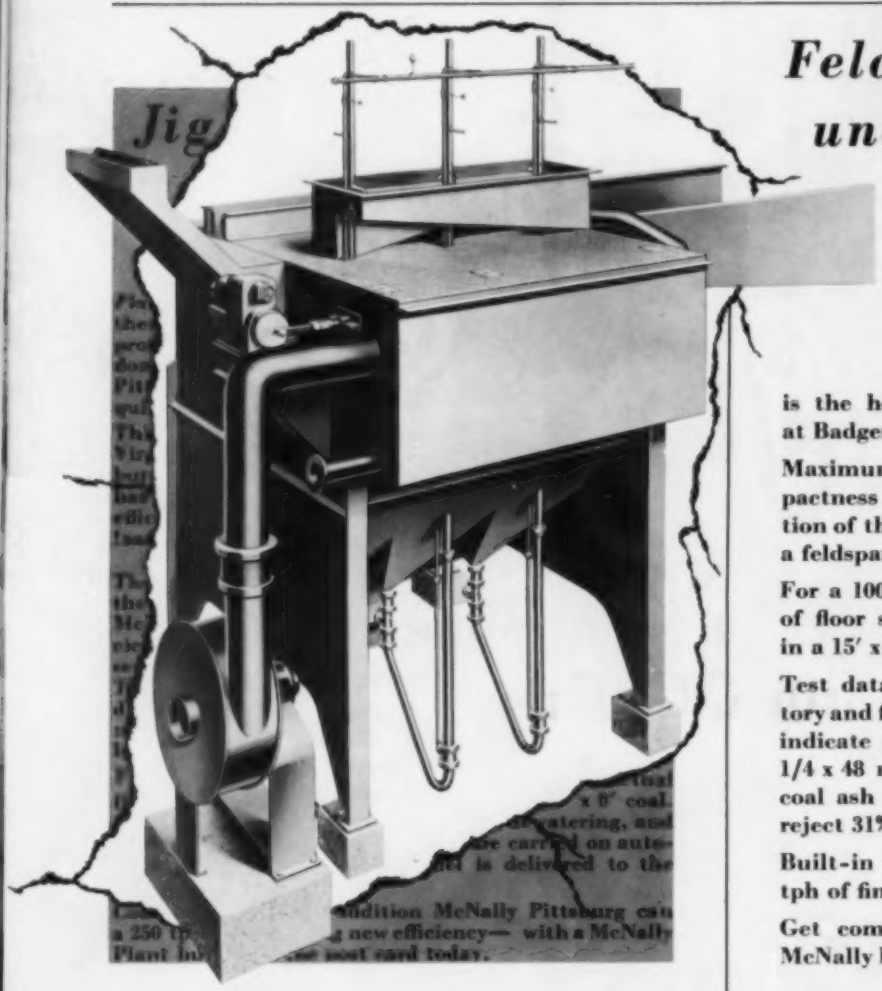
Company_____

City and State_____

☐ **Have Sales Engineer call for further consultation.**

c

THE NEW McNALLY FINE COAL JIG



Feldspar Jigging under Positive Automatic Control!

This McNally Fine Coal Jig is the heart of the new plant addition at Badger Coal Co.

Maximum cleaning efficiency and compactness are made possible by the application of the Baum principle combined with a feldspar bed.

For a 100 tph capacity jig only 240 sq. ft. of floor space required! Can be installed in a 15′ x 16′ bay!

Test data already collected from laboratory and field operations of this new washer indicate an over-all efficiency of 97% for 1/4 x 48 mesh, with feed ash 29%, washed coal ash 11%, refuse ash 69%, amount of reject 31%.

Built-in capacity ranges of 20 tph to 100 tph of fine coal feed.

Get complete information on the new McNally Fine Coal Jig. Mail the card today.

Ask the men who know coal from the ground up

McNALLY PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio

FIRST CLASS
PERMIT No. 93
(Sec. 34.9, P. L. & R.)
PITTSBURG, KANS.

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

4c-POSTAGE WILL BE PAID BY—

McNally Pittsburg Mfg. Corp.

PITTSBURG, KANSAS

Four Ways to Save Money with CRD One-Use Bits

1. You drill faster with low-cost Le Roi-Cleveland CRD one-use bits because they have a special offset gauge feature which permits the use of thinner wings, and a steeper reaming angle. Binding is greatly reduced, and ample clearance is provided for cuttings.

2. You have less drill-steel breakage with Le Roi-Cleveland CRD one-use bits. The method of bit attachment eliminates threads on the drill rod. And since a drill rod is only as strong as the root diameter of its threads, the tapered, *threadless* CRD's give you a stronger, power-saving union, and longer drill-steel life. Other savings result from reduced handling and reconditioning costs.

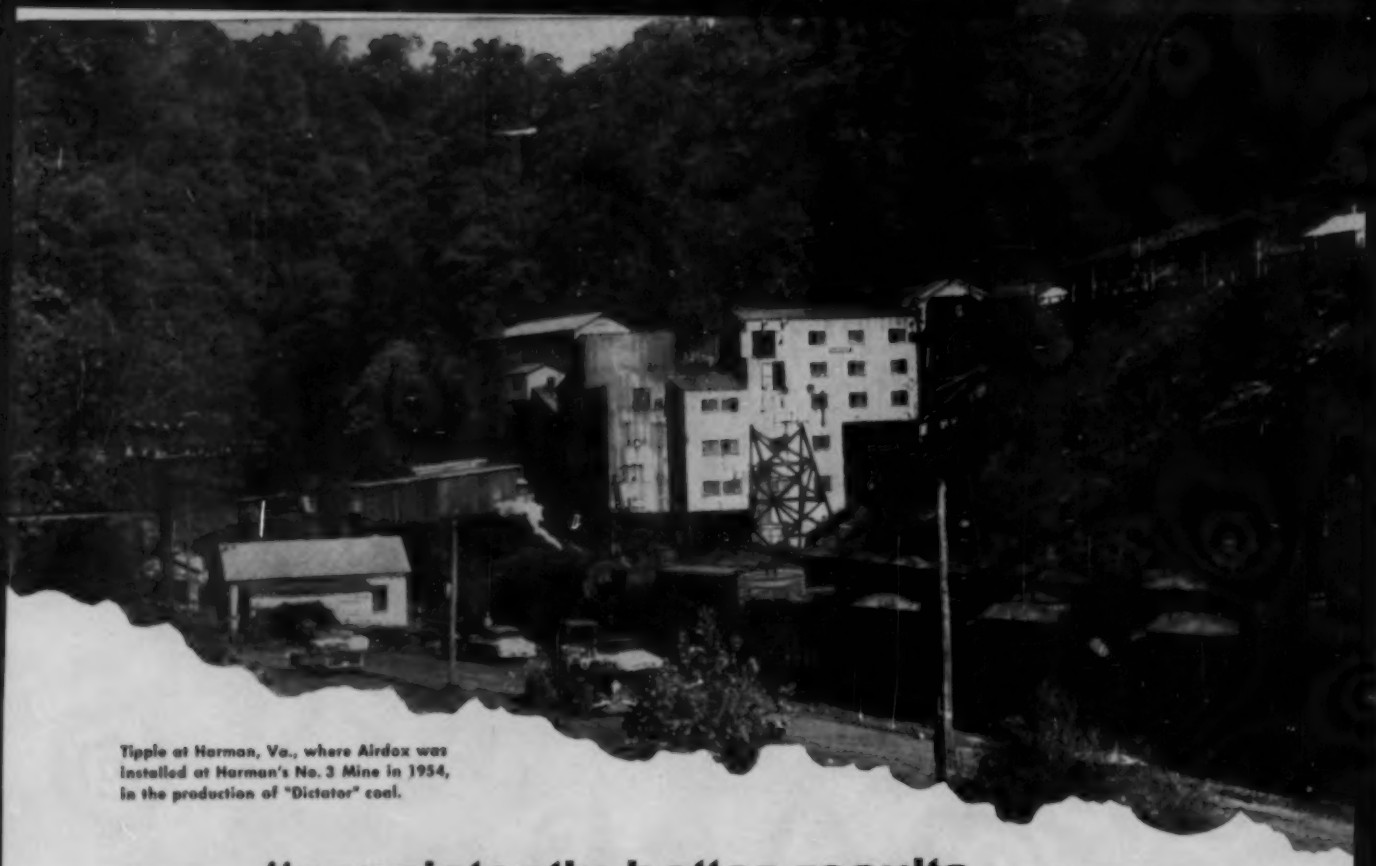
3. You have less wear and tear, too. Rifle bars, rifle nuts, and chucks will last longer because CRD's are designed to reduce binding and ease strain on rotation parts of your drills.

4. They cost less, initially. CRD's cost less than 25¢, half as much as comparable multiple-use bits. There's a big saving in time and labor spent handling bits, too. CRD's knock-off, throwaway use eliminates unscrewing, and all the time-consuming traffic between operator and bit shop.

It costs practically nothing to try them. You don't need to invest in special threading or reconditioning equipment when you use Le Roi-Cleveland CRD one-use bits. Satisfy yourself that they can save you money. Get a can today, and start cutting your drilling costs right away.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

AT-71



Tipple at Harman, Va., where Airdox was installed at Harman's No. 3 Mine in 1954, in the production of "Dictator" coal.

"consistently better results with AIRDOX"

NON-EXPLOSIVE MINING METHOD

AIRDOX

NON-EXPLOSIVE MINING METHOD

Cuts Costs 5 Ways

- Produces less fines in face preparation
- Rolls coal forward for faster, easier loading
- Easier on "tender" roofs—cuts timbering, bolting
- Lowers cleaning costs by minimizing fines
- Reduces degradation—no shattered coal

DICTATOR

says I. J. RICHARDSON,
President,
Harman Mining Corporation

"Cardox Corporation installed their Airdox System in our No. 3 mine in 1954. We find that we are getting consistently better results with Airdox, inasmuch as the coal produced from this mine contains a larger percentage of coarse coal and the loadability is much better when loaded mechanically. Airdox is economical, too, on a cost-per-ton basis.

"The management of this mine is well pleased with the performance of Airdox and results obtained."

CARDOX CORPORATION • 307 NORTH MICHIGAN AVENUE • CHICAGO 1, ILLINOIS

WAREHOUSES and DISTRICT OFFICES

Harper, West Virginia
Phone: Clifford 3-4811

Boston, Illinois
Phone: Boston 6-2521

St. Clairsville, Ohio
Phone: St. Clairsville 619

Pikeville, Kentucky
Route 2, Box 99
Phone: Belcher Creek 3

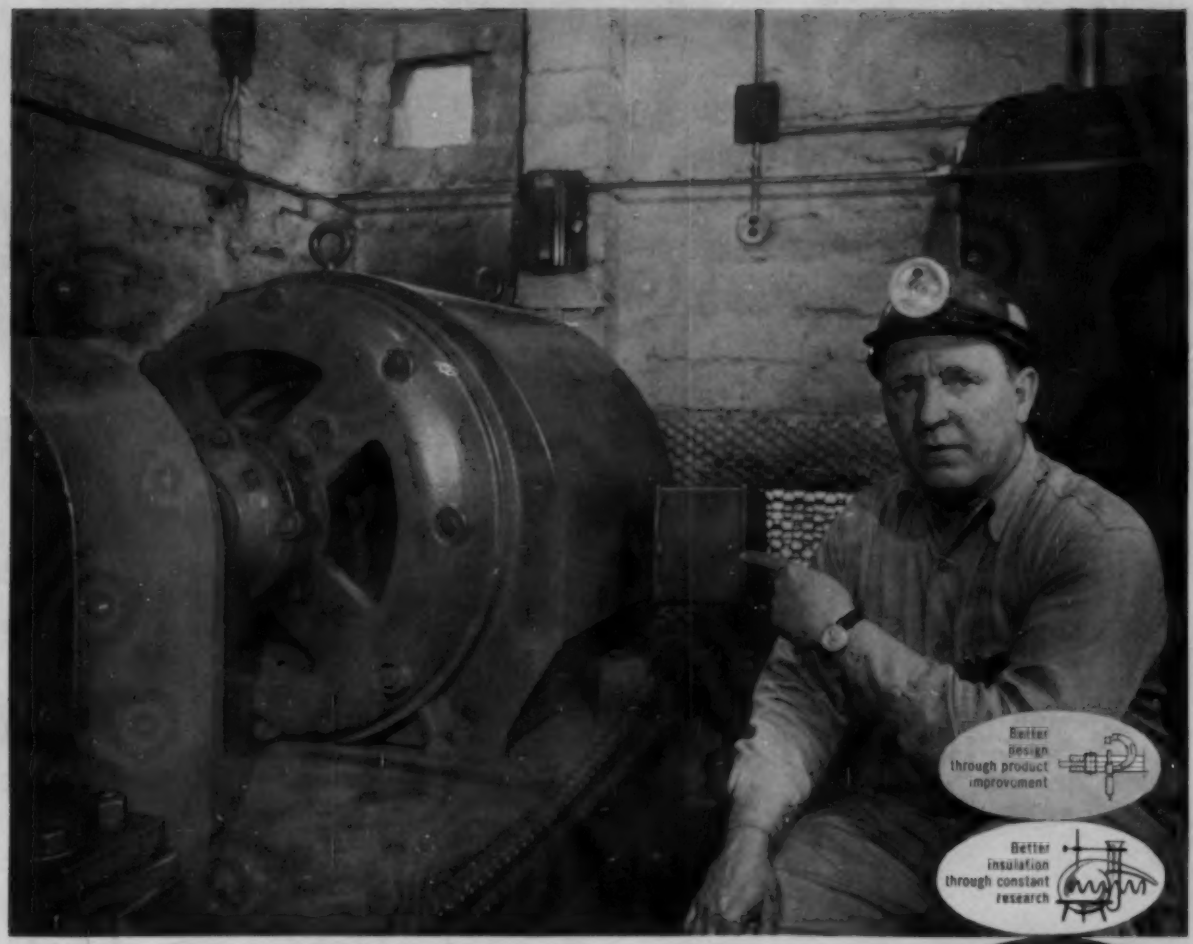
Louisville, Colorado
Phone: Boulder
Hillcrest 2-7741

Library, Pennsylvania
Box 427
Phone: Library Tennyson 5-6910

Camden-on-Gauley, W. Va.
Phone:
Camden-on-Gauley 2101

Evansville, Indiana
207 Northwest Fifth St.
Phone: Evansville 3-2554

Ottumwa, Iowa
Phone: Ottumwa
Murray 4-6564



These motors mean life for 156 men underground

Louis Allis motors provide unfailing drives for mine fans exhausting explosive and poisonous gases

Here's a performance record that's hard to beat — not a single mine shutdown due to exhaust-fan power failure since the installation of two Louis Allis 200-hp motors in 1951.

"These motors have been operating day-in, day-out on a round-the-clock basis — without failure, breakdown, or maintenance — for the past six years," reports the mine superintendent of a prominent West Virginia coal mine.

That's pay-off performance where it's really needed. Even a short interruption in service might permit the formation of poisonous or explosive gas pockets. At best this would mean shutting down the mine, a safety test, and a complete recycle of fresh air before the men could re-enter. This recycle period incurs a production loss that might equal $1000.

Louis Allis drip-proof motors provide the same reliable, trouble-free service regardless of application. Louis Allis features include moisture- and corrosion-resistant cast-iron housings and special varnishes, rigid end brackets, and locked bearings. They are properly lubricated and ventilated for long life.

Investigate these and Louis Allis Bureau-of-Mines-permissible motors for underground installations. Contact your Louis Allis District Office or write The Louis Allis Co., 441 E. Stewart St., Milwaukee 1, Wis.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Stainless Steel screen outlasts carbon steel 4 to 1

and it's <u>still</u> going strong

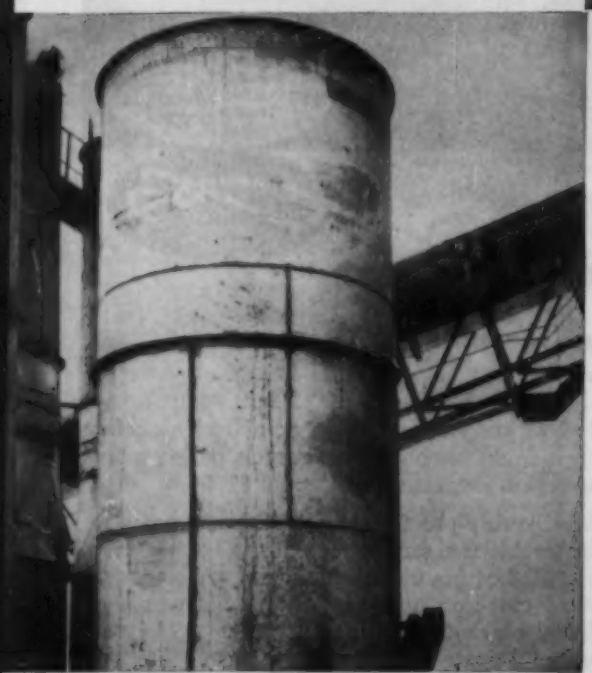
AT BATON COAL COMPANY
RACHEL, W. VA.

▲Stainless Steel screen after one year of service. Previous carbon steel screen lasted only four months.

The big picture shows a Hendrick screen made from type 304 Stainless Steel. It receives about 1,500 tons of coal per day for sizing. The screen replaces a carbon steel screen of identical dimensions. The carbon steel screen *blinded* in just three months; that is, the holes closed with rust caused by the corrosion and accumulated waste materials.

The Stainless Steel screen, after a *year* of operation, is still in excellent condition, and will undoubtedly serve for a long time to come. It has already handled 500,000 tons.

Stainless Steel is extensively used at this mine as liner material for chutes and sluices. It replaces carbon steel, which, in many cases, has corroded through completely. Another interesting application of Stainless is in the exhaust gas scrubber. The columns are nine feet in diameter and 21 feet tall. They are completely built from type 304 Stainless, which, in the words of the chief engineer, is the only material that could handle the severe corrosion and abrasion involved.



Exhaust gas scrubber. It is made from 3/16" type 304 Stainless.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

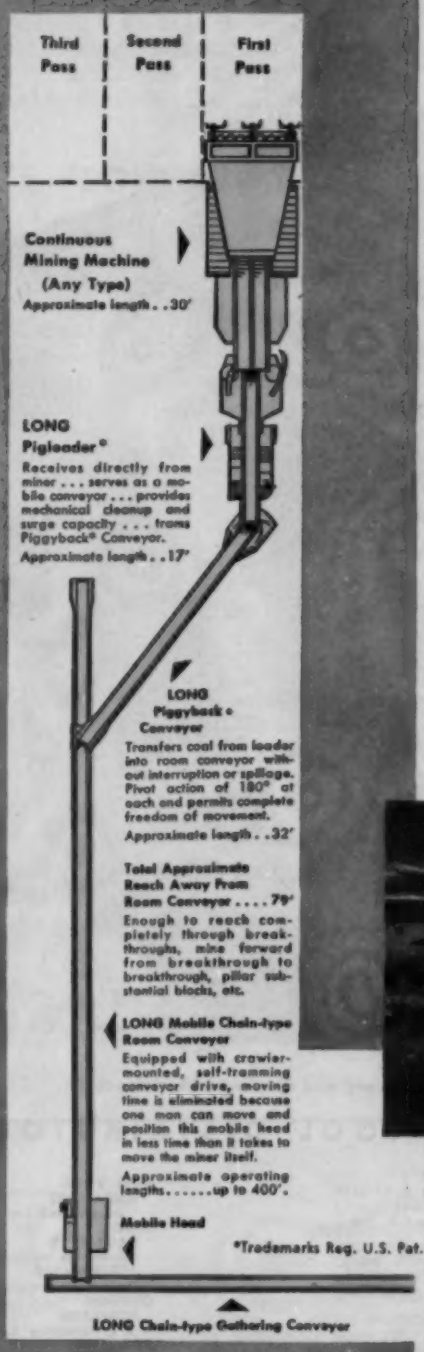
USS

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

7-693

UNITED STATES STEEL

How the Piggyback Conveyor System...keeps continuous mining machines working more hours per shift


Third Pass
Second Pass
First Pass
Continuous Mining Machine (Any Type)
Approximate length . . 30'
LONG Pigloader*
Receives directly from miner . . . serves as a mobile conveyor . . . provides mechanical cleanup and surge capacity . . . trans Piggyback* Conveyor.
Approximate length . . 17'
LONG Piggyback* Conveyor
Transfers coal from loader into room conveyor without interruption or spillage. Pivot action of 180° at each end permits complete freedom of movement.
Approximate length . . 32'
Total Approximate Reach Away From Room Conveyor . . . . 79'
Enough to reach completely through breakthroughs, mine forward from breakthrough to breakthrough, pillar substantial blocks, etc.
LONG Mobile Chain-type Room Conveyor
Equipped with crawler-mounted, self-tramming conveyor drive, moving time is eliminated because one man can move and position this mobile head in less time than it takes to move the miner itself.
Approximate operating lengths. . . . . up to 400'.
Mobile Head
LONG Chain-type Gathering Conveyor

As many leading coal companies already know, the Piggyback Conveyor System is the most practical, most economical method of face transportation for continuous mining. Because it eliminates lost time for car changes, this continuous-flow equipment assures maximum working time at the face—makes it possible for continuous mining machines to operate more hours per shift. Coal is loaded and moved from the face to the outside in a steady, uninterrupted stream *as fast as it's mined.* The result: more tons per man, higher continuous tonnages and less cost per ton.

Whether you're using continuous mining machines or conventional mining units, it will pay you to consider the many advantages provided only by the Piggyback Conveyor System. We'll be glad to supply complete information—without obligation.

Check these advantages of the Piggyback System for continuous mining

Fewer delays • Higher capacity • Lower maintenance • Fewer men in face crew • Fewer nonproductive men • Less down time • Better cleanup • Better operator attention • Greater concentration of mining • Longer economical haulage distances.

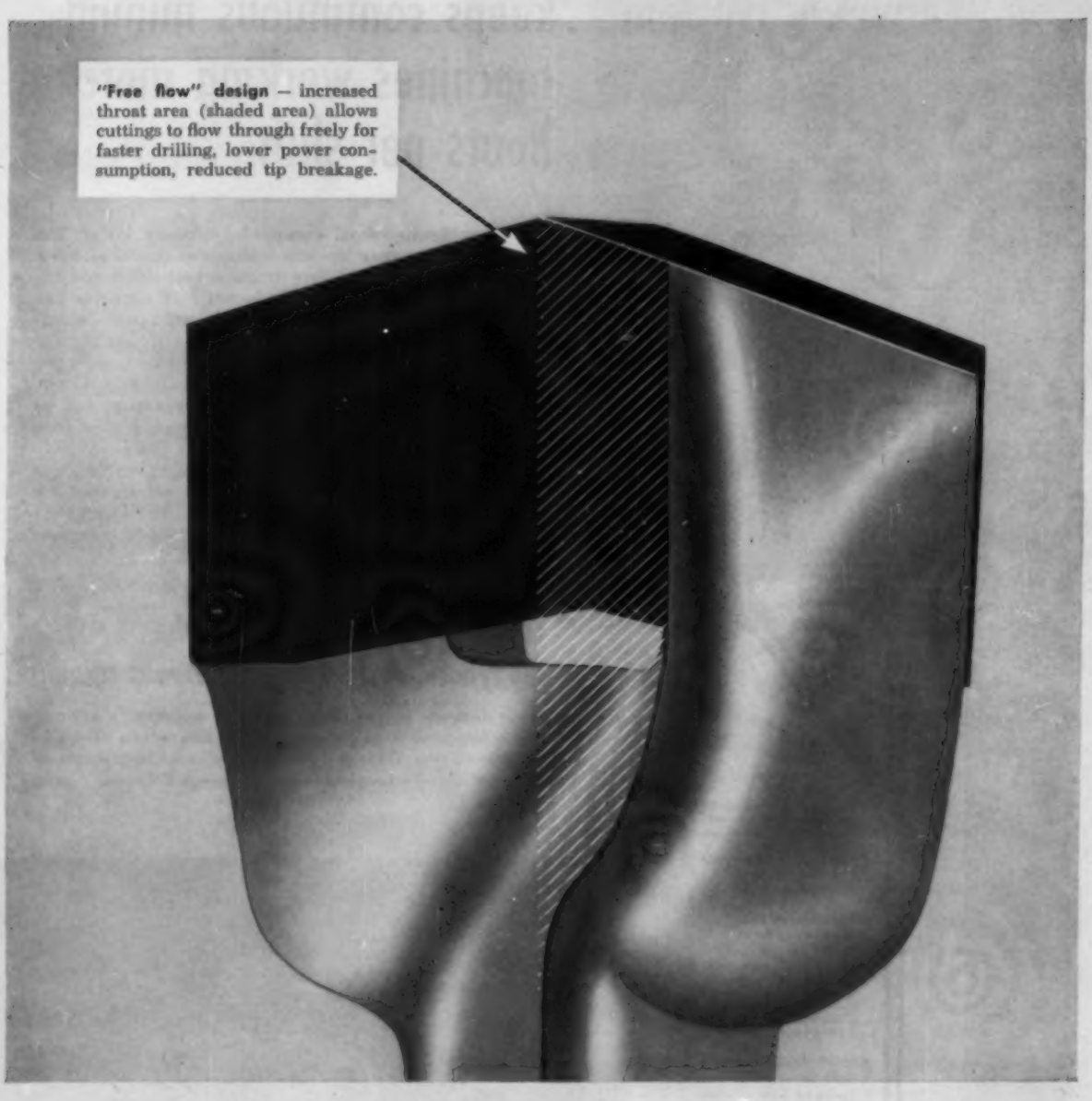
Piggyback Conveyor System in operation, servicing continuous mining machine that has delivered single shift tonnages of over 800 tons. Receiving end of Piggyback is attached to Pigloader loading machine and follows it as it moves.

*Trademarks Reg. U.S. Pat. Off.

The LONG Company
OAK HILL W VA

New from tip to shank!

"FREE FLOW" DESIGN MAKES NEW


"Free flow" design — increased throat area (shaded area) allows cuttings to flow through freely for faster drilling, lower power consumption, reduced tip breakage.

Complete Service Through Factory and Distributor Assistance

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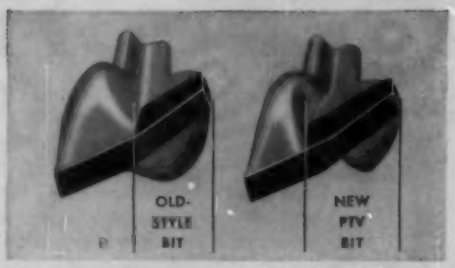
CARBOLOY® PTV BIT 3 WAYS BETTER!

1 "FREE FLOW" design means faster, easier drilling

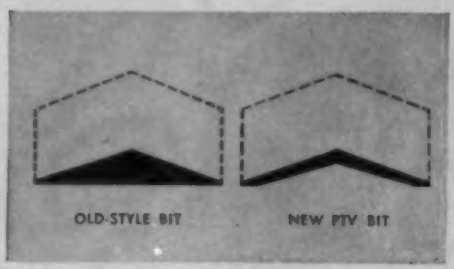
Larger throat area allows cuttings to flow through freely – reduces packing and stalling. Result: faster penetration, cooler cutting. Modern heat-treating permits use of less bulk steel without sacrifice in strength.



Old-style bit (left) has more bulk steel on prongs – is more likely to pack and stall. Streamlined PTV (right), with its open-throat design, allows freer flow for faster drilling.

2 "FREE FLOW" design means more economical operation

Bit is easier to recondition, because there is less steel to grind. Power consumption is reduced by freer cutting action. Machine downtime is cut because bits drill longer, more continuously. Also, with a PTV you get almost 100% use of carbide—less wasted carbide after normal life.

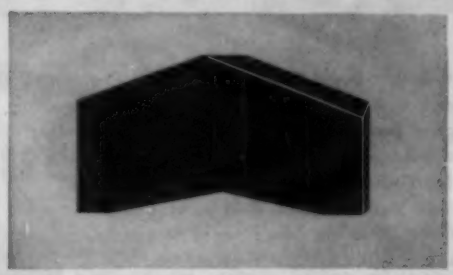


Old-style bit (left) leaves wasted triangular section of carbide (shaded section) after normal life. New PTV (right) gives almost 100% utilization of carbide by eliminating unusable section.

3 "FREE FLOW" design means longer bit life

Less packing and stalling minimize chance of tip breakage – while heat-treating makes the new PTV just as rugged as old-style conventional bits. And in a Carboloy carbide tip, you have the most wear-resistant carbide used in any standard roof bit!

This new PTV bit is now available from your Authorized Carboloy Mining Tool Distributor. Call him today (his name is listed below), or write: *Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Michigan.*



Here's the most wear-resistant carbide on any standard roof bit. Lets the PTV drill longer, more continuously. Economical, too, because it permits many more regrinds.

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Euclids are

PACE-SETTERS for PROFITS

For coal stripping operations Euclid Rear-Dumps and Bottom-Dumps rate high in keeping overburden and coal hauling costs low. Their ability to stay on the job month after month, with less down time for servicing and repairs, has made "Eucs" the first choice of leading mine operators. Have your nearby Euclid dealer make a production and cost estimate for your operation . . . there's no cost or obligation, and there's a good chance that he can show you how to cut your hauling costs.

• Rear-Dump Euclids, of 10, 15, 18, 22, 40 and 50 ton capacities, are powered by diesel engines of 128 to 600 h. p. With standard 5 or 10 speed transmission, or with Torqmatic Drive, they have a range of travel speeds up to 36 m. p. h. with full payload. These "Eucs" are unequalled for performance and low operating cost on the toughest jobs. No matter what your off-the-highway hauling requirements may be, there's a Euclid model that can haul more loads per hour at lower cost per ton or yard moved.

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EUCLID DIVISION GENERAL MOTORS CORPORATION,
Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

Drills can run "wide open" when equipped with Kennametal FDH Roof Bits

No production delays here...

KENNAMETAL* Roof Bits keep roof bolting out in front

From actual performance records...

- 60 holes per shift drilled and pinned in laminated roof by one man
- 70 to 80 holes per shift drilled and pinned in solid sandstone by two men

Performance such as this is typical of what Kennametal FDH Roof Bits can do for you.

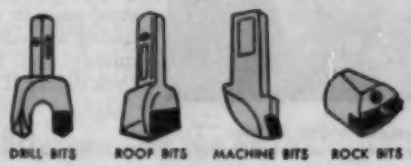
Modern drills make fast roof bolting possible, but the bits must be able to stand up under the added punishment. Kennametal FDH Roof Bits can take it, allowing you to take full advantage of high powered drills. Superior grades of Kennametal carbide withstand the severe shock and abrasion of high thrust and high torque. Roof Bolting Crews can work faster, allowing Face Crews to move in without delay. As a result, more coal is mined per shift, more money saved.

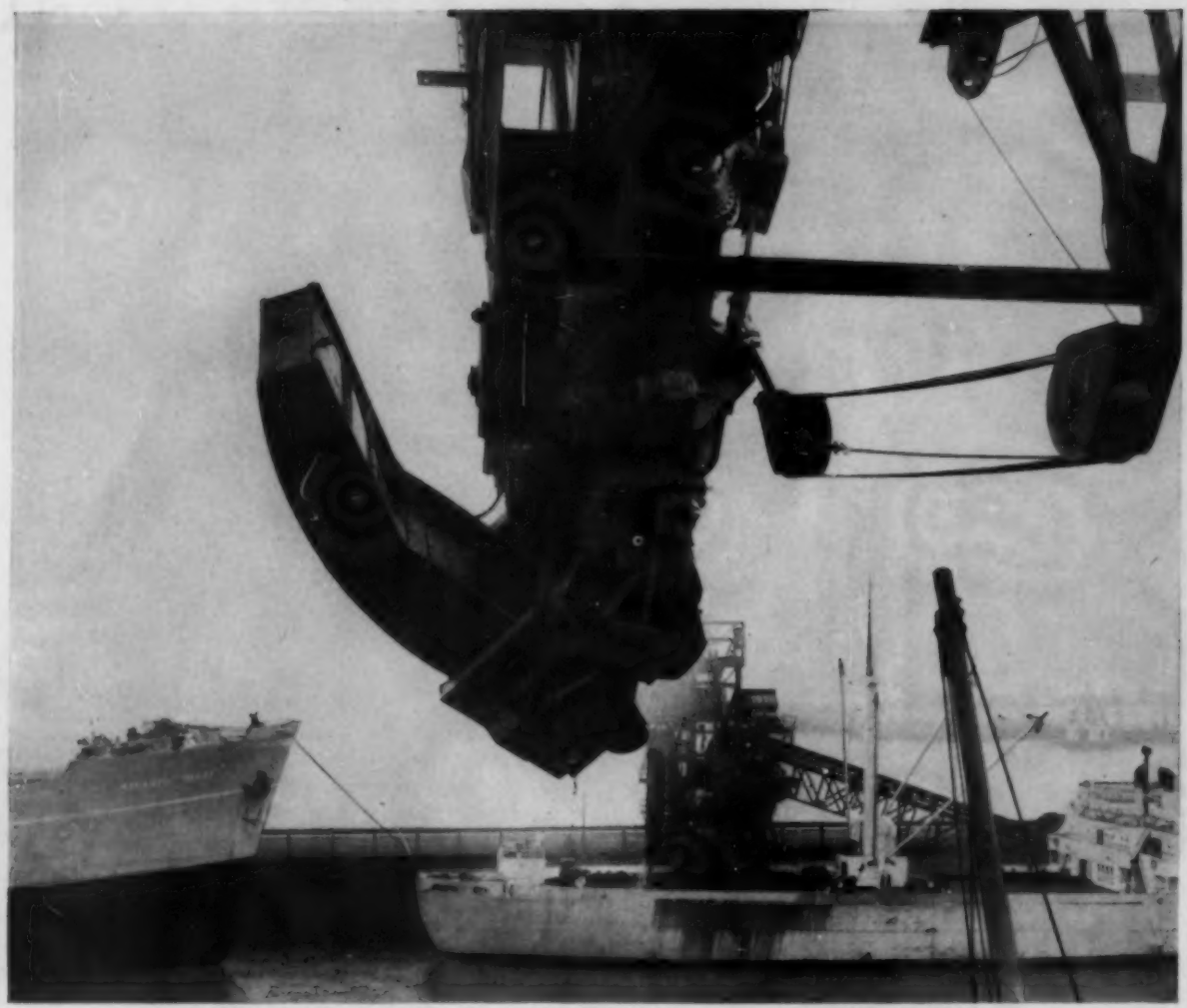
Let your Kennametal Representative help you select and actually test in your mine the Kennametal Bit designed to best match your operating conditions. Why not give him a call? You'll find his name listed in the Classified Section of your Telephone Directory under "Mining." Or, write KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.

*Trademark

8101

INDUSTRY AND KENNAMETAL ...Partners in Progress





At world's most modern coal docks, Newport News, Va., C&O uses coal trimmers of Lukens "T-1" Steel.

New Coal Loading Machine is tougher and lighter—made with Lukens "T-1" Steel

TRADEMARK

Tough, weight-saving Lukens "T-1" gives this trimmer added mobility.

When the C&O Railway designed this huge new coal trimmer, they chose Lukens "T-1" steel for its combination of high strength and toughness—plus ready workability. Construction required less steel, produced outstanding abrasion resistance.

Now with stepped up efficiency, this mammoth machine easily and economically deposits 2,000 tons of coal an hour deep in the holds of ships—with a minimum of wear and maintenance.

Whether you handle coal, stone, gravel or metal ores, Lukens "T-1" steel used in areas hardest hit by punishing abrasive impact will save you money, too. It has tripled the life of rock driers. The 321 minimum Brinell quality has been known to outlast previous metals by 18 to 1 in quarry wear plates. Chutes, hoppers, and mine cars are other typical applications.

And Lukens "T-1" steel retains its remarkable toughness at temperatures well below zero. Send for our informative illustrated booklet, "Lukens 'T-1' Steel." Write Manager, Marketing Service, Room 962, Lukens Steel Company, Coatesville, Pennsylvania.

LUKENS

Helping industry choose steels that fit the job

MOVES ANYWHERE IN THE MINE . . . CUTS ANYWHERE IN THE SEAM

the Goodman *All-Purpose* Coal Cutter

Here's a versatile, fully maneuverable, fast cutting machine that will move anywhere in the mine and cut anywhere in the seam . . . to keep your loader in coal, your shuttle cars on the move.

- **It's versatile—top, center, bottom cuts or shears with no blind spots top to bottom, or from rib to rib.**
- **It's fully maneuverable—a 90" wheel base provides full mobility, even in limited space. And at 220 fpm, with positive control of speed and steering, little time is lost moving from face to face.**
- **It's fast cutting—variable speed, hydraulic feed of the cutter arm insures cutting as fast as bits will dig into the coal.**

Automatic bugduster for bottom cutting—Goodman motors for AC or DC operation.

Full hydraulic control of all movements except the cutting chain give safe, fast performance. Conveniently located controls, on both sides of machine, respond quickly—smoothly to the operator's touch.

As for maintenance—a Pennsylvania mine using the Goodman Cutter reports two years of triple shift operation with only negligible attention. Another mine reports no replacement parts needed after 15 months of double shifting. Both mines were working in pitching seams.

For profitable cutting, the Goodman 2400 series all-purpose cutter can't be beat. Let us give you the full story.

GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

PORTABLE

CABLE

IF IT CARRIES CURRENT KW CARRIES IT!

"TOUGHEST, MOST FLEXIBLE TRAILING CABLE WE'VE EVER USED IN OUR MINES"

Says General Superintendent

"In fact," says Mr. L. G. Bishop of De Bardeleben Coal Corp., "the KW Laytex® 'Kaiser Master' Trailing Cable undergoes the roughest service you can think of.

"Because of the low roof in our mine, many of our cutting and loading machines cannot carry a reel. That means the full length of the cable (over 400 feet) is dragged and yanked over rough, sharp-edged stones and through wet areas."

Flexibility helps prevent cracking, breaking

Mr. Bishop and his fellow officials of the mine also like the flexibility of KW "Kaiser Master" cable—*a stiffer cable would crack or break when pulled from its coil.*

"What's more," says Mr. Bishop, "KW's resistance to cuts and bruises helps to prevent short circuits. It's the smoke from short circuits that drives miners from their working areas.

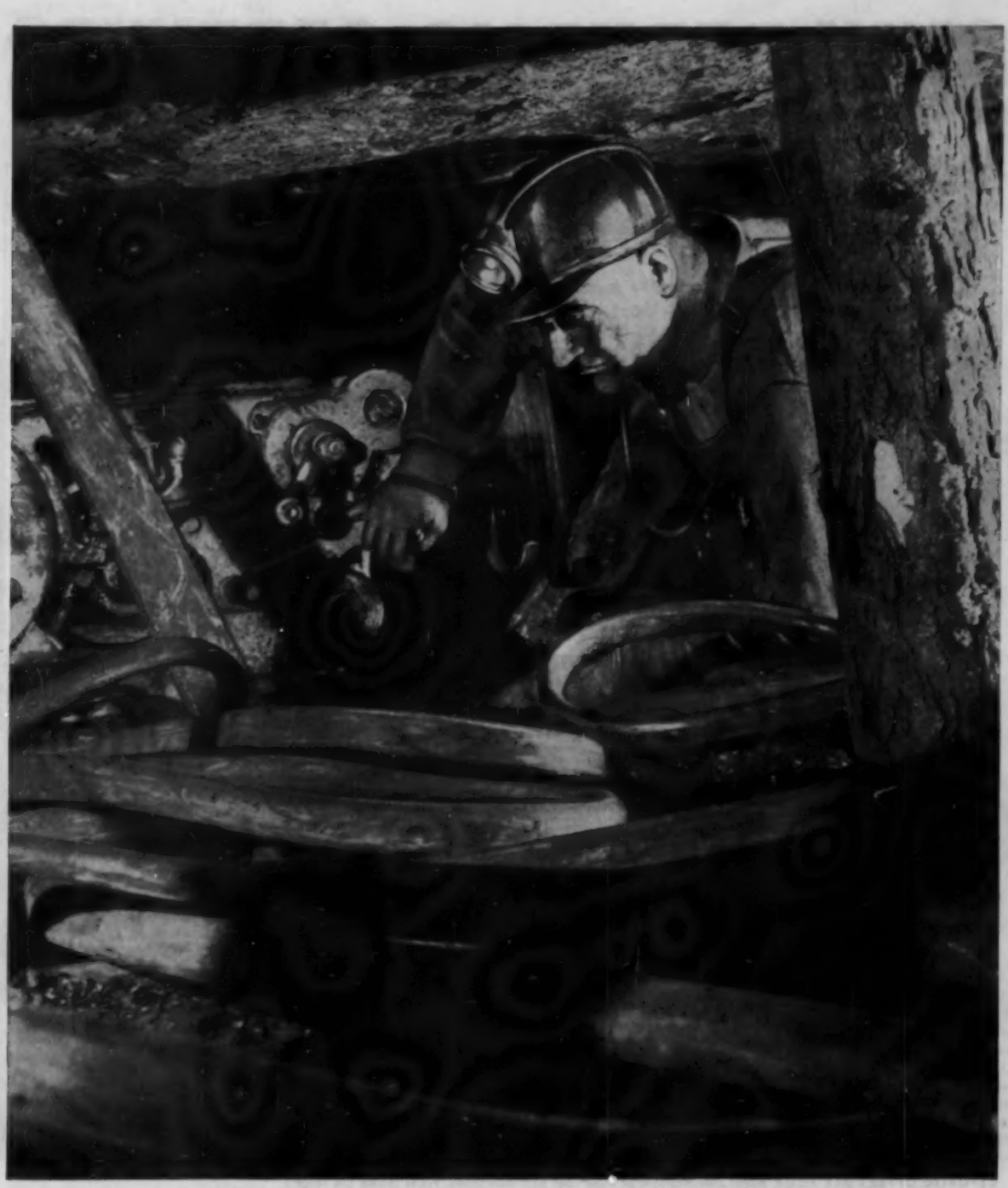
"That's one more reason why we plan to convert completely to KW 'Kaiser Master' Trailing Cables."

A KW representative will be glad to give you immediate service to your needs. Call the Kaiser Aluminum sales office or KW distributor listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., *Executive Office,* Kaiser Bldg., Oakland 12, Calif.; *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois.

Tough—KW Portable Cable can take the punishment of being *repeatedly run over* by heavy equipment like this!

Dependable—KW cable stands up under this kind of treatment as *regular routine*—hauled, jerked and dragged over wet, rough mine floors.

Flexible—KW cables *go anywhere* in the mine . . . and whether on or off the reel, it's cable nobody has to "baby."



Here's an off-track coal-cutting machine being used in the mine's 23½-inch coal seam. The KW "Kaiser Master" Trailing Cable is pulled along behind it, since no reel can fit into this space.

Kaiser Aluminum

IF IT CARRIES CURRENT, K/AL CARRIES IT!

ONLY REPUBLIC CERTIFIES

EVERY MILL SHIPMENT IS CERTIFIED by an individually filled-out Republic Mine Roof Bolt Material Control Certificate. Specific performance characteristics are shown for the heat, or heats, of steel used in the particular order. Consistent top quality is assured.

MINE ROOF BOLT MATERIAL CONTROL CERTIFICATE

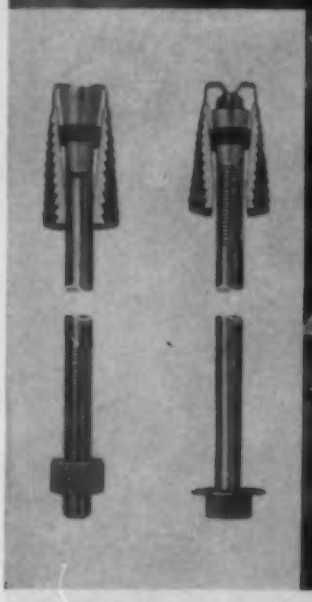
Republic Steel Corporation hereby certifies that the mine roof bolts included in mill order number _____ were made from the following steel:

HEAT NO.	YIELD POINT (PSI)	YIELD POINT (POUNDS)	BREAK POINT (POUNDS)

The above figures are correct as contained in the official records of the Corporation.

BY _____
CHIEF METALLURGIST, BOLT AND CHAIN DIVISION

REPUBLIC STEEL CORPORATION
General Offices • Cleveland 1, Ohio



REPUBLIC OFFERS ALL FOUR major classifications of mine roof bolt assemblies. Types shown are forged wedge head bolt, developed by Republic, and square head bolt with wedge nut and rigid expansion shell.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

ROOF BOLT PERFORMANCE

to guarantee consistent top-holding strength

Now, when you specify Republic, you get positive proof of reliability in every mine roof bolt you receive. Republic, alone, provides written evidence—in the form of the Mine Roof Bolt Material Control Certificate—showing specific performance characteristics of the steel used in every shipment of roof bolts.

To establish positive identification, each Republic Material Control Certificate bears the number of the mill order it covers. Next, the heat number of the steel used and its yield point in pounds per square inch are given. Finally, yield and break points, in pounds, are shown for the bolt size being supplied.

This information is invaluable in establishing placement patterns and methods, to provide maximum protection of men and machines in all bolted roof areas. In effect, you get pre-tested roof bolt performance—a major factor in securing better-than-ever roof control.

Republic is able to provide exact performance data, through complete control of all roof bolt manufacturing operations, from raw ore to finished product. In every case, yield and break strengths are guaranteed to meet or exceed Specification ASTMA-306 physical requirements, submitted by The Committee on Roof Action as mining standards. Finally, every Republic Mine Roof Bolt produced is performance certified *at no extra cost* to you.

For the full story on Republic PERFORMANCE CERTIFIED Mine Roof Bolt Assemblies, contact your local Republic office. Or mail coupon.

PERFORMANCE EFFICIENCY of this disc-type filter was increased two ways when cotton cloth was replaced by Republic ENDURO® Stainless Steel screen. First, much smaller fines were recovered. Second, intervals between filter replacement were extended many times. Republic ENDURO Stainless Steel is ideal for a wide variety of mining equipment applications. Send for data.

CORROSION RESISTING PERFORMANCE of Republic FE Flexible Plastic Pipe has solved expensive replacement problems in this mine-water-handling system. At last report, Republic had outlasted conventional piping by six to one in terms of time. Moreover, Republic FE is easier to install—and to relocate to meet changing needs. Send for details.

BOLTED ASSEMBLY PERFORMANCE can be no better than the reliability of its fasteners. Because Republic Bolts and Nuts are produced under a coordinated quality control program, from ore to finished product, their absolute dependability is assured. Equipment producers can choose from over 20,000 standard and 8,000 special types and sizes. For facts, mail coupon.

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☐ Mine Roof Bolts ☐ ENDURO Stainless Steel
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for short interval delay blasting use

PRIMACORD MS CONNECTORS

Better fragmentation, reduced vibration, controlled throw . . . these are some of the advantages obtainable with short interval delay firing. Primacord MS Connectors enable you to set up delays in your Primacord surface trunk lines.

The Connector consists of a copper tube about 2¾ inches long, containing an element which produces a delay measured in milliseconds. A piece of Primacord approximately 12 inches long is crimped in each end of the tube. The Primacord trunk line is cut, and the Connector is joined to the two ends with tight square knots. Or, the ends can be lapped to the main line and bound with electrician's tape. It will function equally well lying on the ground, suspended in the air, or covered with sand. In wet conditions the Connectors should be raised out of the water.

Like Primacord itself, the MS Connectors are not affected by stray electrical currents, and can be used whenever such currents might be encountered.

See your explosives supplier or write to

THE ENSIGN-BICKFORD COMPANY • Simsbury, Connecticut

Primacord, Quarrycord, Ignitacord,® Safety Fuse, Blasting Accessories

Established 1836

Cut the Primacord trunk line and tie in the Primacord MS Connector using square knots drawn up tight.

Packed in tubes of 50 — 500 Connectors to a case.

PRIMACORD®

PROVED AND APPROVED DETONATING FUSE

P-20

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

COAL AGE

DECEMBER, 1957

IVAN A. GIVEN, EDITOR

Faith and Works

THERE IS NOW a growing trend toward challenging forecasts of increased coal production, especially those that might be classed as more than mildly optimistic. The basic reason, perhaps, is that 1957 showed no increase in bituminous output and, in fact, is expected to wind up some 5 million tons or so shy of the 1956 total. At the same time, productive capacity is being materially increased by plants now being completed or in the construction stage. Oil and gas continue to hack away at the railroad and domestic markets, and could, if they chose to price with that as their objective, enlarge their participation in other markets at the expense of coal. And nuclear power is being touted as a big, new coal competitor in the not-too-distant future.

Technology Too

Even if substitutes do not hold down or eat away coal's markets, the possibility of more efficient utilization must be reckoned with. Direct reduction of iron ore, if it took over from the blast furnace, could cut coal use 50% or more per ton of pig, and is cited by the more pessimistically inclined as an example of a possible technological development that could curtail coal's opportunity. Technology, however, works both ways. It is expected to put coal back on the railroads, and could put it into the business of furnishing liquid fuels and gas.

Big Difference

Pessimism is popular at times, and at times there is justification for it. Is this one of those times? Is there anything basically different in the present picture to warrant the feeling that coal is destined for another setback? There are definitely some further losses in prospect, but they are in known areas and cannot be as great as others that have been taken in the past—railroad fuel is an outstanding example. Others, as in pig iron, are still only possibilities that may never become actualities, or if they do will be later rather than sooner. And oil and gas, though it might not seem so at first glance, are not finding things as easy as they have been. The big difference in the present-day coal picture, then, is the fact that there has been a mild business recession—and as always when business slows down coal slows down with it.

Faith and Works

Adding it all up, there is nothing significantly new to warrant a pessimistic approach to coal's future. Certainly the basic approach of the old-established bellwether companies is not one of pessimism. Take Island Creek, for instance. It is one of a number of outstanding career companies in coal, and since it came out of its development stage nearly half a century ago has prospered through thick and thin. It is now, as its president, Raymond E. Salvati, pointed out during the recent Newcomen Society ceremonies honoring the organization, second in dollar sales and third in annual production among commercial operators. It has attained that position through both faith and works—faith in the basic values of coal and works in the production of the highest-quality product at the minimum cost.

The Only Way

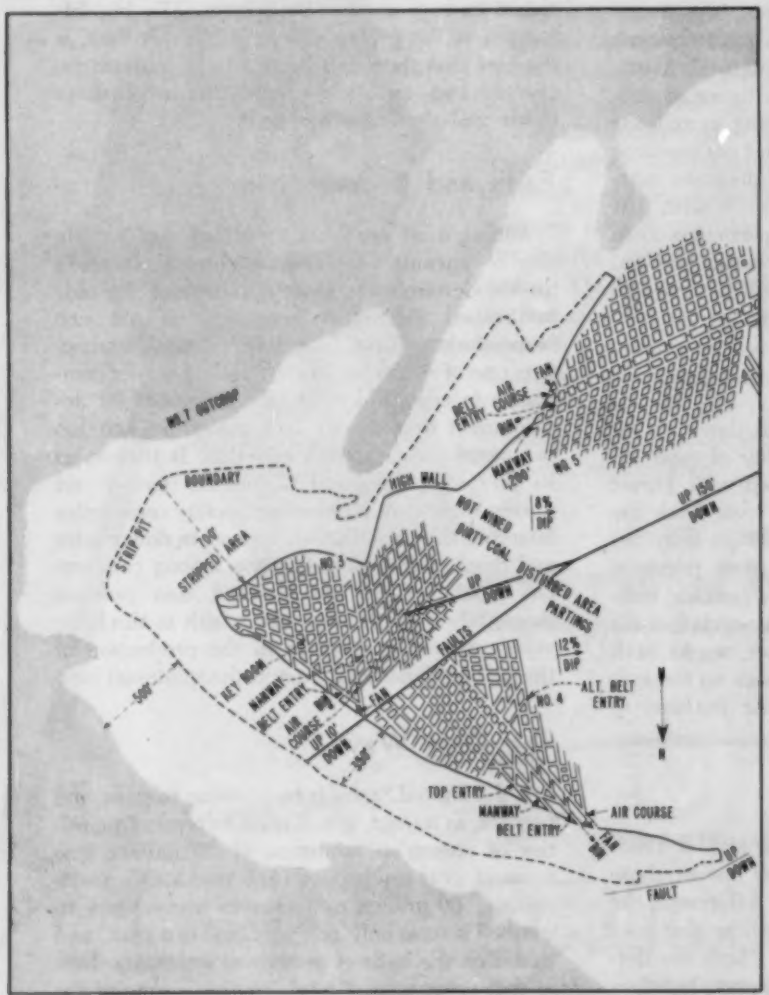
If the United States is to continue to grow and prosper, as it must, it will need increasing quantities of energy—a minimum of 30 million tons more of coal equivalent each year and a maximum of 60 million or more for many years to come. There is only one way coal can plan, and that is on the basis of getting an increasing share of that rising energy total. Today, in spite of the slowdown resulting from the business recession, coal still has the best opportunity in history, and with it the means of cashing in.

How Rainbow

Mobile machines plus belts, storage bins and trucking chosen to complete Rainbow property after stripping. Four small openings were the answer to faults and other adverse natural conditions.

By **Louis A. Engstrom,**
Engineer, Gunn-Quealy Coal Co., Quealy, Wyo.

FROM STRIP TO DEEP—start of the No. 4 underground operation at Rainbow mine, near Rock Springs, Wyo., where unusual conditions demanded new approach.



DEVELOPMENT BY SMALL MINES was necessary to complete Rainbow property as a result of contour and seam conditions, including faults.

THE GUNN-QUEALY COAL CO. is attempting to find the pot of gold in its No. 6 Rainbow underground mine near Rock Springs, Wyo. If there were rainbows 160 million years ago, during the Upper Cretaceous period, then it should be logical to assume that the No. 7 seam of the Rock Springs formation was an ideal spot for the ends of certain ones. In looking at some of this hard, clean coal rainbow colors are reflected with pleasing brilliance.

Upon completion of the Rainbow strip mine, which used a walking dragline with a 14-yd bucket and 180-ft boom as the principal piece of equipment (*Coal Age*, October, 1951), the company went back to underground mining. Many firsts for the company and men were to be experienced in the new underground mines. In an attempt to keep pace with mounting costs, changing markets and labor conditions, it was decided to go to mobile mining methods using cutting machines, loaders, shuttle cars, roof-bolting and belt haulage.

Small Mines the Answer

Completion of the strip pit left a long distance of the No. 7 seam exposed. The total tonnage was not great and an underground operation

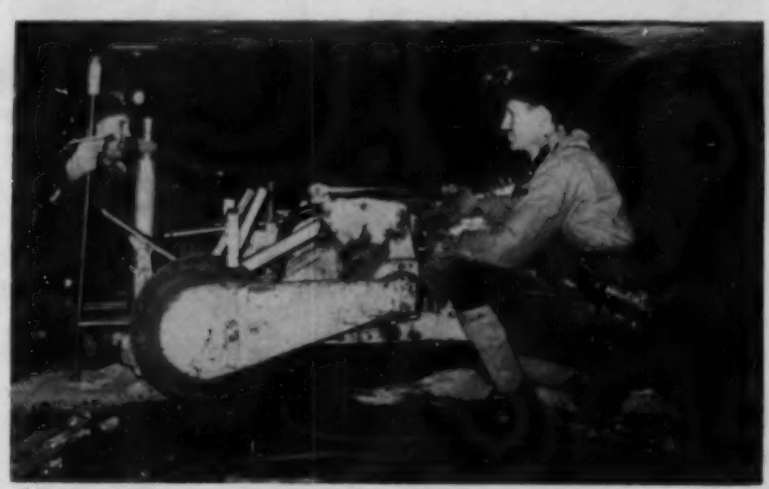
BELT TO TRUCK BIN is haulage backbone at Rainbow deep operations, with trucking downhill to the tipple to handle 500 tons per shift.

One good thing about the thinner coal is the quality. It is high, reflecting a high Btu content and low ash. As a rule the only impurities come from a ¼-in sandstone band 6 in from the top of the seam. The presence of this band indicates normal seam conditions, and when it is absent there are likely to be other impurities and abnormal conditions present. The floor is a solid 40-ft sandstone member that may have a shale capping a few inches thick. The roof consists of alternate layers of hard and soft shales, sandy shales and sandstone that afford favorable strata for roof control by the use of roof bolts. An 8% to 12% dip to the west-southwest is common in the area. Thickness of the overburden over these mines has ranged up to 300 ft. The seam has been dry at these depths and mine water is not a problem.

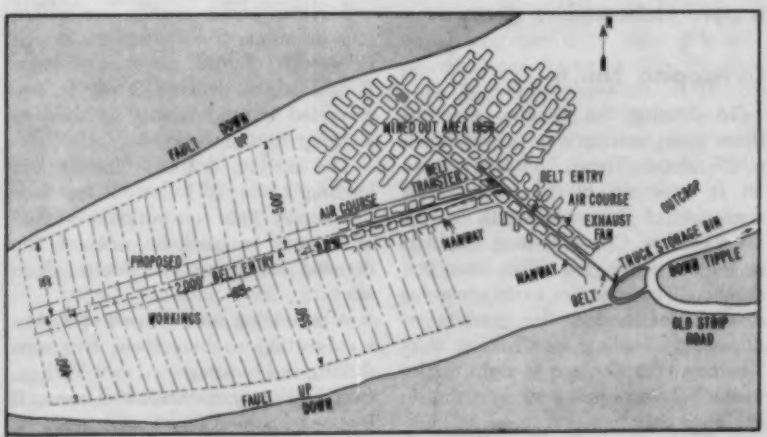
Contour Mines

could be justified but, due to the contour of the highwall, property lines, faults and areas of dirty coal, the tonnage had to be mined by four separate small mines. The accompanying map, showing three of the mines, illustrates this condition. Hence it is readily seen that with such large moving and installation costs we had to look elsewhere to find the pot of gold.

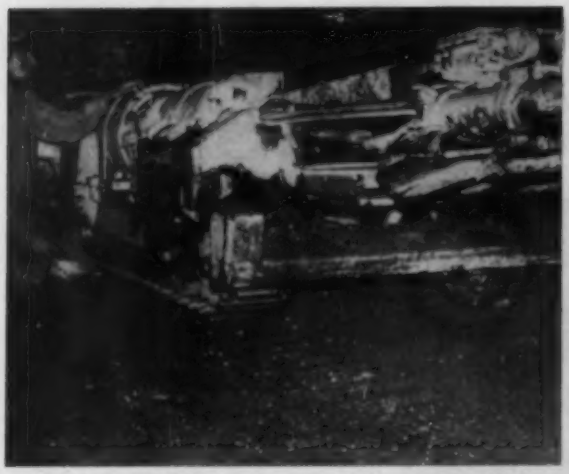
Upon completion of the three earlier mines the present No. 6 mine opened in June, 1956. Its location could take advantage of the power lines and road system already established. This mine also has its faults. This rather narrow piece of coal is an up-block between two faults having displacements of 100 ft to the south and around 400 ft to the north boundary. These faults must have had some bearing on mine conditions as there is considerable local warping and dip and thickness changes. In very short distances the thickness varies from 48 to 41 to 56 in, and these conditions dictate mining methods. This No. 7 seam has been a large producer in the Rock Springs field since the 1870's. It varies from 3 to 9 ft, with the northern portion of the field having the thicker coal and the southern portion of the field (where Gunn-Quealy operates) the thinner.



ROOF-BOLTING is the first step in the face cycle. Roof conditions are favorable for bolting. Some bolts are recovered in pillaring.



RAINBOW NO. 6 DEVELOPMENT with belt to truck bin. This is the last of the four that will complete the small-mine phase Rainbow operation.



CRAWLER LOADERS served by shuttle cars handle the loading job and start the coal to the outside.

LUMP COAL, here shown on its way to the storage and truck-loading bin, is major reason for conventional mining.

RAINBOW NO. 6 DEVELOPMENT with belt to truck bin. This is the last of the four mines that will complete the Rainbow operation.

However, water from surface tanks is piped to the working places.

Developing No. 6

To develop No. 6 mine a set of three main entries was driven down a 6% slope. These "A" entries are 18 ft wide on 60-ft centers, with cross-cuts of the same width on the same centers. Crosscuts from the belt, or middle entry, are offset from one another. This permits more room for loading points, and also permits independent loading from either side. The crosscuts also are at right angles to the belt to permit a straight shuttle car approach.

Rooms are turned off the aircourse and manway opposite the crosscuts to the belt. Room centers are 65 ft and room grades usually are within plus or minus 2%. Rooms are driven in groups of five on the advance. Pillars, which average 30x40 ft, are extracted on the retreat as soon as a group is completed.

The cutting, drilling, blasting and loading cycle is followed for face operations. This conventional method of mining is used because of the demand for lump and intermediate sizes.

A producing unit consists of a two-man cutting-machine crew, two men drilling and blasting, two men loading, two shuttle-car operators and one unit foreman, or nine direct men per unit. Maintenance and indirect labor brings the unit-crew total to 12 men.

Bolting First

The first operation in a normal cycle consists of drilling and bolting the roof. Bolts are installed on 4-ft centers. In some local areas, cap pieces or planking in various lengths are used in conjunction with the bolts to control sloughing and dropping of loose material. In room advance a row of mine timbers is set 4 ft from each rib for additional protection. The 1⅝-in bolt holes are drilled with electric rotary drills using tungsten-carbide bits for the 30- to 48-in long bolts. A ¾-in steel bolt with expansion shell and 6-in-square plate are used.

Bolts are set at 200 to 250 ft-lb, and unit foremen are supplied with torque wrenches for constant check. As a rule, a place is bolted immediately after loading. If the place is left unbolted, as over a week-end, some weakness may appear. An average of 85 bolts per unit is installed per shift. The use of an electric impact wrench permits the salvage of some bolts when pillars are being pulled.

Following bolting, the face is undercut and drilled. Either may be done first depending on local conditions. Entries and development places are cut 18 ft wide, and rooms from 20 to 30 ft. Rubber-tired mobile cutters with portable hydraulic drills attached, and shortwall cutting machines transported by crawler-type trucks, are used for cutting.

Water under pressure from surface tanks is supplied to the face to allay

the dust during cutting. Plastic pipe is used extensively in the mine. With long periods of continual freezing weather, all water installations must be protected. Water mains therefore are located on the exhaust-air side and special care must be taken when running water lines to the intake side, as freezing may occur as far in as 1,000 ft from the portal opening.

For blasting in development or entry work, four holes are drilled across the face near the ¼-in band 6 in from the roof. Six holes are used in rooms. Three sticks of powder are used in each hole next to the ribs, with two sticks in all other holes.

After shooting, a crawler-type loading machine and two shuttle cars are used to load and haul the coal. Because of low coal the shuttle cars had to be remodeled and their capacity was reduced to approximately 2 tons per trip. The shuttle-car haul has been longer than desired due to the odd shape of the area between the faults. Roof must be taken at loading points to provide enough clearance for shuttle cars to unload.

The Middleton Wheel

Considerable trouble was experienced at the loading points in getting the coal centered on the belt to maintain proper belt training. Many attempts were made to avoid spillage and have the belt train correctly without much success. Finally, a "Middleton wheel," designed by Master Mechanic Horace Middleton, was installed. This wheel works as a rolling wedge to center the load, and therefore reduces spillage to a minimum. Shuttle-car operators are able to unload faster since the "wheel" will trough the coal to the center.

With these wheels spaced at intervals on either side of the belt, and also at belt-transfer points, the coal haulage problems have been minimized. The wheels are old automobile tires mounted on ball bearings and positioned immediately above and to the side of the belt, with the wheel on the same angle as the trough of the belt (see photo). They are free to tool and effectively center the coal on the belt. In addition, they can be installed and moved easily. The "wheels" are set far enough toward the edge of the belt so as not to interfere with supplies when the belt is operated in the reverse direction.

MIDDLETON WHEEL solved the problems of centering coal on belt at transfer points and elsewhere along the units. Consisting of rubber tires mounted on ball bearings, the wheels are free rolling. They are set at the troughing angle to nudge the coal to the center.

Trucks Haul to Tipple

The coal is transported by the belts to a small storage and truck-loading bin. With only a 10-min round-trip haul, the 20-ton-bottom dump trucks are able to keep up with the production of 500 tons per shift. Coal is produced and hauled on a two-shifts-per-day basis.

The mine is ventilated by a two-blade 6-ft fan that supplies 38,000 cfm. When necessary, blades may be added to the fan. The ventilation system is a continuous split, and no regulators or overcasts are required. Plastered metal-lath stoppings are used between the aircourse and intake air entries. Brattice stoppings and line brattice are used as supplementary means of directing air flow in the mine.

The tipple is capable of preparing 1,000 tons per shift. Sizes normally prepared are lump, grate, pea, nut, slack, double-screened stoker. Hot-oil treating with S.A.E. 50 oil can be done as desired. Oil lines are of ¾-in copper inside 2-in steam lines, thus assuring proper conditioning of oil without separate heating lines and recirculating pumps.

The Gunn-Quealy Coal Co. has completed 50 yr of operation and will soon complete this small mine and look forward to the opening of a larger block of coal. With the experience gained in the operation of these small mines, it is hoped better mining practices and increased production per man will lead us to the "pot of gold."

MOUNTAIN TOP STRIPPING has disadvantages that are overcome by high capacity equipment and well planned methods.

Lafayette Springs Strips, Deep Mines

Increasing overburden removal ratio from 1:1 to 16:1 was made possible by changing from shovels to drags. Efficient drilling and low-cost blasting mark operations.

UP-TO-DATE EQUIPMENT and well planned stripping and deep-mining methods help Lafayette Springs Coal Co., Lewisburg, W. Va., to dig deeper and to obtain complete

SEAM LOCATION often permits stripping an island of coal under a ridge top. Practice is to continue around the ridge until it has been stripped completely. Aerial view above illustrates a typical ridge that permits complete recovery.

Distance around Lafayette Springs Coal Co. property totals approximately 30 mi.

Mountain Top Seams

recovery of the coal seams on its property.

Initial stripping was with shovels which limited the overburden taken to approximately a 1:1 ratio. A survey of the property indicated that this ratio could be increased to 16:1 by replacing the shovels with drags. This increase meant that as much as 200 ft more coal could be recovered beyond the shovel limit. Also it made available for stripping, in many instances, territory that could not be reached before. Too, since the seam was under more cover a better quality of coal could be produced.

Lafayette Springs' property is in Greenbrier County, West Virginia, and contains three mineable seams: the Beckley, the Firecreek and the Pocahontas No. 6.

The Beckley seam is 30 in thick and occurs near the top of the mountain at an elevation of approximately 4,000 ft. It is mined by both stripping and deep mining but, due to its location, which often permits stripping an island of coal under a ridge top, the amount of deep mining is limited. The Firecreek seam, with an average height of 36 in, has been stripped but not deep mined. The company plans to deep mine in the near future. The 54-in thick Pocahontas No. 6 is deep-mined exclusively because it is located under the other two seams and stripping would not be economical.

Equipment

High-capacity equipment is the economical key to recovering previously stripped seams at Lafayette Springs. Two major problems were involved. First, the company had to move more overburden because previous stripping units had reached their limits. This problem was solved by changing from shovels to drags, which are more suitable to this type of terrain. Replacements included a new 12-yd Page walking dragline with a 150-ft boom and a converted Lima shovel equipped with a 6-yd bucket and a 110-ft boom. Second, to keep pace with the large drags, the company purchased a Portadrill manufactured by the Winter-Weiss Co. This Model 6TA rotary drill is mounted on a crane-carrier-type all-wheel-drive chassis which utilizes two rotary compressors to remove cuttings.

The main unit employed in recovering the 30-in Beckley seam is the 12-yd drag which works in cover that normally ranges from 40 to 50 ft in thickness, but which on occasions increases to 70 ft. Other excavating units include two Manitowoc diesel shovels with 1¾- and 2½-cu yd dippers to remove the coal, and one bulldozer which helps clean the top of the coal. When not cleaning coal the dozer works in front of the drag to prepare the overburden for drilling.

Drilling and Blasting

Overburden on the Beckley seam consists of a very abrasive shale and some sandstone. The sandstone usually appears in the middle or toward the center of the ridges. When its thickness becomes too great, stripping is abandoned.

Two men operating the Portadrill sink vertical blast holes. By working the day shift only, they can drill enough holes to keep pace with the stripping units which work two shifts seven days a week.

Blastholes are 6¾ in but the size can be varied depending on the type of overburden. Holes are drilled on 20-ft centers and usually extend 100 ft in from the last pass. The rate of drilling, including moving, setting up and drilling, is 60 ft per hour.

Lafayette Springs makes its own blasting agent in a special building designed for efficient handling of the ingredients and the mixed product. Ammonium nitrate and fuel oil are mixed to produce this agent. Two men handle the job of mixing, transporting the medium to the pit and charging the holes. They mix only enough at a time to meet daily requirements.

Holes are charged at an average ratio of 1 lb of blasting agent to 3 cu yd of overburden. But this ratio varies somewhat with the hardness of the overburden. Experience in drilling this type of overburden, plus the drilling rate at each location, tells the blaster how much to charge each hole. Dry cuttings from the vertical drill are used for stemming the hole at blasting time.

Cutting blasting cost is not the only benefit received from this blasting agent. As a result, digging is easier due to better fragmentation which reduces wear and tear on stripping units. Also, more material can be moved per hour.

When more than one pass is made horizontal drilling is employed. Holes are drilled on 12-ft centers and 3 ft above the coal seam. The depth depends on the width of the pass. Ammonium nitrate also is used in horizontal blasting. (*Continued*)

STRIPPING UNIT illustrated above is a converted shovel. It features a 6-yd bucket and a 110-ft boom and provides a second unit for the operation.

HIGH CAPACITY walker-type drag with a 12-yd bucket and a 150-ft boom replaced shovels to permit the company to dig deeper and to extend stripping territory.

UTILIZING EQUIPMENT on hand, the company converted the above shovel to a drag. This eliminated buying a second unit to lend flexibility to the operation.

Removing the Overburden

The company relies on the 6- and one 12-yd drags to remove the overburden in both pits, with one exception; that is, a bulldozer which works ahead with the 12-yd drag in preparing the terrain for the vertical drill. This preparation also permits the drag to maneuver more freely. Other duties of the dozer are to build roads and do certain types of cleanup work.

Lafayette employs the key-cut principle in starting new cuts. In other words, a narrow cut is made on the highwall line, and then the remainder of the lift is removed, after which the dragline moves along to start a new lift. Among other things, this keeps the highwall straight.

Loading and Hauling

Three steps are necessary before the coal is ready for loading.

1. Removing large amounts of dirt from the top of the seam with a bulldozer.
2. Scraping with an Adams grader.
3. Cleaning with hand shovels and brooms.

Even though coal is loaded from the solid, average loading time for the 1¾-yd shovel is approximately 10 min and for the 2½-yd 7 min. Haulage equipment include four trucks, two for each pit. Two are 40-ton Darts with 335-hp Cummins Diesel turbocharged engines and two 28-ton Euclids equipped with 300-hp Cummins diesel engines.

Coal is hauled on the day shift only. Well-constructed and properly maintained roads form a web-like pattern on the mountain tops. They start at elevations as high as 4,000 ft and descend to 3,000 ft to the weighing station and storage bins. The average grade is 8%. Trucks drive on the left side of the road. This gives loaded trucks descending the grade the advantage of the inside or next to the hill side of the road. Maximum haulage distance is 4 mi, with the average approximately 2½. The time required for a round trip is about 45 min. The Adams grader also maintains the haulage roads.

Maintenance

The maintenance crew works from a central shop located near the stripping operations. The crew consists of four men: one general mechanic, two welders and one diesel specialist.

The two welders are kept busy rebuilding drag buckets. The company has four buckets, two of which are in use while the other two are being rebuilt. Upkeep of the buckets has been a major expense to date but hard-surfacing rods and high-carbon plate are expected to reduce this expense considerably.

The shop crew maintains all equipment on the latter, and hourly lubrication is performed by one man stationed on each machine. Load and hoist lines are changed every 6 wk and every 4 mo, respectively. Buckets are changed about every 6 wk for reconditioning.

The mining property is 30 mi from the main office. This made communication difficult until Motorola and General Electric two-way radios were placed in service. Radios were installed at the office, in company vehicles and at the weighing station. Aside from achieving better control of stripping operations, lower operating costs were realized by reducing automobile mileage, making better use of managerial time and speeding field repairs and maintenance.

To insure against radio failure, the company has a service contract with the Motorola company. This service includes monthly checks of each radio. Necessary repairs are made on the job.

Due to the pitch of the seams most of the water drains off naturally and in most cases in favor of the stripping operation. Consequently, drainage is not a major problem at Lafayette. However, wet seasons create certain conditions which require the use of a portable pump. The 6-in pump is mounted on a truck bed and is driven by a six-cylinder gasoline engine equipped with an electric starter. Racks are constructed on the truck to permit carrying several sections of 6-in flexible hose.

Deep Mining

Deep mining on a large scale is limited because the seams are located near the tops of the mountains and distances through them range from 1,000 to 2,000 ft. However, deep mining is essential to recover as much of the coal as possible since it is not feasible to strip the complete hill tops.

The company subleases the mines to men well qualified to manage small operations. These men furnish their own equipment. Property is subleased

BULLDOZER working in front of the drag prepares overburden for vertical drilling. This also permits the drag to concentrate on removing blasted overburden.

TEAMED for efficient haulage, these units transport coal for distances up to 4½ mi one way on roads with an 8% grade. A round trip takes about 45 min.

OVERALL VIEW of the stripping operation is shown above. Cleaning and loading are carried on with a grader, shovel and trucks.

MAIN STRIPPING UNIT begins by removing overburden along highwall line. This practice keeps the highwall straight.

STRAIGHT HIGHWALL is the result of good stripping methods. The key-cut principle is used in starting new cuts.

PORTABLE DRILL sinks enough holes in one shift to keep stripping units working two shifts seven days a week. Dry cuttings from the drill are used for stemming.

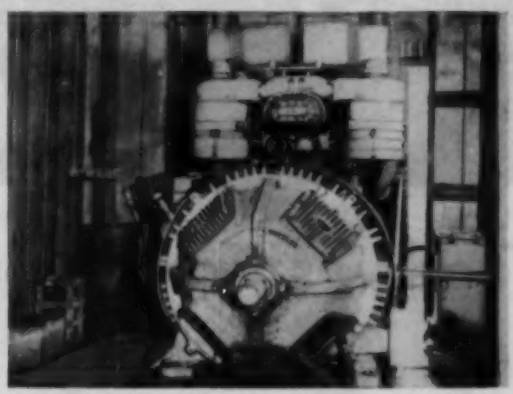
HORIZONTAL DRILL is used when a second pass is made. Holes are drilled on 12-ft centers and 3 ft above the coal. Holes are charged with ammonium nitrate.

PITCHING SEAM eliminates drainage problems for Lafayette. This feature is in favor of the stripping operation.

PORTABLE UNIT equipped with a 6-in pump and several sections of flexible hose is maintained, ready for use at any time.

TYPICAL PUNCH MINE operation in the Pocahontas No. 6 seam. Mechanical loaders load into 1¾-ton shuttle cars which transfer the coal onto a belt conveyor. Trucks haul coal from the bin to the preparation plant.

CONVEYOR BELT hauls coal from the mine to the outside. Protection against weather is provided by a metal roof over the belt.



DIESEL-ELECTRIC sets provide power for deep-mine operations on the property.

in 15- and 20-acre sections and limited to approximately 1,000-ft depths. Where distances through the mountains exceed 1,000 ft, a mine is set up on the opposite side of the ridge. These mines in turn sell the mined coal to the leasers.

Six mines are in operation at the present time, one in the Beckley seam and five in the Pocahontas No. 6. As stripping operations continue more territory is made available for new deep mines. Projected plans call for opening eight additional mines in the Beckley and three in the Pocahontas seams. Present output is approximately 400 tons per day and will be increased to 1,000 to 1,200 when the new mines are in full production.

The Pocahontas No. 6 is an evenly bedded seam with a slate roof and fireclay bottom and averages 4½-ft in height. A section is as follows: 6 in of coal, 4 in of bone, and 44 in of coal.

Mines are laid out on a three- or five-entry system with headings on 60-ft centers, depending on the type of equipment used. Coal is cut with shortwall machines. Since the coal is soft, only three holes are required for shooting, one center and one each side. Roof is supported by props supplemented by cross bars as necessary. DC power is supplied by 250-v diesel and gasoline generator sets.

Coal is loaded by 12BU and 14BU loaders which load into shuttle cars 20-in high with a capacity of 1¾ tons. Where chain conveyors are used, loaders discharge directly into the conveyor. Both types of section haulage equipment transfer the coal to belt conveyors which move it to the outside and into bins. Trucks load from these bins for the haul to the weighing station and the preparation plant.

As to the output from the property, C. F. Cunningham, Gen. Mgr. puts it this way: "Our daily tonnage is determined by the number and size of orders received. We have never failed to fill an order regardless of the amount." Lafayette Springs concentrates on keeping enough coal uncovered to produce large quantities when necessary. At times extra trucks are rented to meet these orders.

Lafayette Springs Coal Co. has been operating on a lease of approximately 4,000 acres since 1951 and has unmined reserves of approximately 12,000,000 tons. The organization is headed by John Wade Bell, Jr., president; Castle F. Cunningham, treasurer and general manager. Warren M. Ervin is superintendent. In charge of other important departments are Ralph Peake, maintenance; Hayden W. Williams, preparation; R. A. Wiersteiner, general books; Drama H. Burke, payroll and shipping; Don McGuire, engineering; John S. Stump, Jr., chief counsel.

Today's Conveyor-Belt Picture

Average conveyor-belt life	6.2 yr
Minimum life	2.0 yr
Maximum life	15.0 yr
Average expenditures for conveyor-belt replacement at mines using it	1.6c per ton
Minimum expenditure, approximate	0.5c per ton
Maximum expenditure, approximate	6.0c per ton

OVER 5 MILLION FEET of conveyor belt is being used by the coal-mining industry underground and in strip pits and surface plants. If the plans of present and intended users are carried out—as they undoubtedly will be—the total in service will show a rapid rise in the years immediately ahead. These are among the conclusions that can be drawn from a recent *Coal Age* survey to determine the trend of conveyor-belt installation and to obtain data on belt life and purchasing considerations.

Average belt life reported by the coal companies that submitted data, weighted in accordance with tonnage produced, is 6.2 yr. The minimum life reported was 2 yr; the maximum, 15. Average expenditures for conveyor-belt replacements at mines using it are calculated at 1.6c per ton on the basis of going belt prices. This, incidentally, is the same as the average for conveyor-belt expenditures by companies responding to a National Coal Association committee survey of supply costs.

Belt Usage

Fifty-one companies supplied data to *Coal Age* in sufficient detail for use in determining the preceding and other figures. These 51 companies operate 187 mines expected to produce around 164 million tons in 1957 or nearly one-third of the expected bituminous output. They also use one-third or more of the conveyor belt and expect the total to rise substantially. Several other companies, in addition to those now using belt conveyors, report that they expect to install such equipment in the future.

Belt purchases by the 51 companies supplying data ranged from 500 to 75,000 ft, including both replacement and new. Details are shown in an accompanying table. On the basis of weighted average belt life, these companies in 1956 purchased belt for new installations equivalent to nearly one-third of the total already in service.

Belt Life

Reported belt life, as previously noted, ranges from 2 to 15 years. Companies using belt conveyors in the face sections tend to report a

somewhat shorter life than those primarily employing belts for other purposes—main lines, slopes and preparation plants, as examples.

Further rises in the use of belt conveyors are definitely in the cards. Twenty-eight of the 51 companies whose data are included in the compilations presented in this article expressed the belief that their purchases of conveyor belting would increase in the next 5 yr. These companies accounted for three-fourths of the tonnage represented by the group supplying useable data. Only a minority expected a decrease in the next 5 yr.

Other Haulage

In contrast to the increase in belt haulage, respondents generally expected little change or a decrease in rail and rubber-tired haulage underground, though there were a few exceptions. Of those who expressed an opinion, about one-third expected an increase in truck haulage on the surface and the remainder, with a very few exceptions foreseeing a decrease, expected no change.

Although no questions were asked as to *why* belt use would increase, it is logical to conclude that the extensible units are a major factor, along with the trend to production from the thinner seams. In addition, belts are finding wider use in stockpiling, preparation and loading, including barge loading, on the surface.

Purchasing Considerations

From the standpoint of major considerations in the purchase of belts, "quality" and "price" were neck-and-neck in number of mentions, followed closely by "manufacturer's reputation" and "service from manufacturer," also neck-and-neck. "Engineering and design" ranked fifth, with "reciprocity" sixth and "immediate delivery" seventh. "Nearness of supplier" received no mentions.

In written-in comments, those who responded to the survey tended to emphasize as important good engineering prior to installation and more checking by manufacturers' representatives afterward to insure correction of adverse conditions and the best in maintenance. More consistency in belt prices was noted by several as a present-day need.

1956 Conveyor-Belt Purchases

Forty-five Deep or Deep-and-Strip Companies

	Belt Footage			Belt Life
	Replacement	New	Total	Years
Over 3,000,000 Tons:				
1	1,000	10,000	11,000	7–10
2	3,000	—	3,000	5–8
3	4,000	15,000	19,000	5
4	—	42,500	42,500	5–15
5	4,000	—	4,000	3
6	2,500	4,500	7,000	3
7	39,000	30,000	69,000	2–15
8	45,000	30,000	75,000	5
9	20,000	—	20,000	5
10	10,000	50,000	60,000	5–7
11	—	50,000	50,000	5–6
1,000,000 to 2,999,999 Tons:				
12–14	10,000	5,000	15,000	4–5
15–16	700	300	1,000	8
17	—	5,000	5,000	—
18	6,000	7,200	13,200	5–7
19	2,000	7,500	9,500	3–5
20	2,100	4,000	6,100	5
21	2,000	12,000	14,000	5–10
22	1,200	800	2,000	—
23	—	2,000	2,000	3
24	4,000	29,000	33,000	7
25	1,000	3,000	4,000	—
26	13,000	12,000	25,000	10–12
27	500	500	1,000	5
28	—	—	—	5
29	—	—	—	10
30	1,500	8,000	9,500	5–7*
31	5,000	—	5,000	5
32–33	2,000	4,000	6,000	10
34	—	8,000	8,000	10–15
500,000 to 999,999 Tons:				
35	3,600	3,000	6,600	5
36	—	6,000	6,000	—
37	1,200	—	1,200	3
38	1,000	1,500	2,500	4–5
39	1,000	—	1,000	4–6
40	—	—	—	2
41	2,270	—	2,270	5
42–43	—	—	—	5–6
Under 500,000 Tons:				
44	20,000	—	20,000	3
45	3,000	4,000	7,000	7
46	6,000	—	6,000	3–5

Five Strip Companies

Over 3,000,000 Tons:				
47	3,000	2,000	5,000	3–6
1,000,000 to 2,999,999 Tons:				
48	250	250	500	4–8
49	—	—	—	10
50	2,000	—	2,000	2–4
500,000 to 999,999 Tons:				
51	—	—	—	8
Total	222,820	357,050	579,870	

*Mines only; life in preparation plants, up to 10 yr.

INSPECTIONS should include scheduling equipment for overhauls. Close check on the maintenance requirements of the units will indicate when they should be overhauled. Set up a time table for equipment overhauls.

Inspection Guide for

Haulage equipment and other service units are covered in this final installment of the equipment-inspection guide. Each is treated separately. How to go about the inspection and what to look for on each machine are described in detail.

The first part of this guide, dealing with substations and electrical systems, appeared in the October 1957 issue. The second, in the November issue, covered face equipment and component parts.

By Daniel Jackson, Jr.
Assistant Editor, Coal Age

Section Haulage Equipment

EQUIPMENT used in hauling coal from the working face to the transfer point includes shuttle cars, belts, and chain conveyors. This equipment should be inspected separately because (1) section haulage plays an important part in the production of coal and (2) the construction and operation of this equipment varies greatly.

The shuttle car is a complex machine which should be inspected frequently. Therefore, it should be understood that on each inspection considerable time must be spent to check it thoroughly. It is suggested that the shuttle car be checked during an off-shift or when it will not be in use for a period of time. The best approach in preparing for the inspection is to remove all guards, covers and inspection plates at one time to avoid distraction and interruption of the inspection.

The inspection can be divided into four parts:

Electrical.
Mechanical.
Hydraulic.
Lubrication.

Electrical inspection—Tools needed to inspect the shuttle car electrically are volt-ohmmeter, hook-on-type ammeter, insulation-resistance tester and a small spring scale to check the brush pressure of motors. However, an inspector's most valuable tools in detecting present and future trouble are his five senses.

Items which should be included in the electrical inspection are:

Motors.
Operating controls.
Contactor panel.
Wiring and junction boxes.
Cable-reel collector rings.
Lights.

All motors should be inspected before any other items are checked. On one type shuttle car this would include: two traction, two conveyor and one pump motors. The number of motors will vary with the type of car. Proceed with motor inspection as outlined previously in Part II. As a reminder, check commutator for high mica, flat spots, burns and grooving. Also, see that the commutator is free from dirt and grease. The brush rigging should be checked for neutral point and brush-holder adjustment. Test brush pressure. See that short, chipped and uneven brushes are replaced. If insulation shows signs of heat it may be advisable to take insulation-resistance test to determine its condition. Motors should be checked for excessive grease, oil and dust. Keep motors clean at all times.

Operating controls, such as off-on-reset switch, accelerating foot switch

MODERN TRACK HAULAGE EQUIPMENT must be inspected frequently to insure uninterrupted transportation. They should be inspected during off-shifts so that complete, detailed reports can be made on each unit.

Deep Mine Equipment

MONTHLY—LOCOMOTIVE INSPECTION REPORT LOCOMOTIVE NO._____ DATE:_____

MECHANICAL INSPECTION	√ REPAIRED	√ O.K.
MECHANICAL		
Gong or Bell		
Suspensions		
Frames		
Bumpers		
Sand Rigging		
Brake Rigging		
Spring Rigging		
Journals & Pedestals		
Wheels & Axles		
Gearing		
Gear Cases		
Air Brakes		
Hydraulic Brakes		
GENERAL INSPECTION	√ REPAIRED	√ O.K.
Checked all leads and bushings to apparatus		
Checked all insulating bushings		
Cleaned		
Tightened all bolts with lock washers		
Cover plates in place		
Seals		
All insulation checked		
Lubricated in accordance with Westinghouse Lubrication Chart		
ELECTRICAL INSPECTION	√ REPAIRED	√ O.K.
MOTORS		
Commutator		
Brushholder		
Brushes & Shunts		
Fields		
Armature		
Bearings		
Gears & Pinions		
Axle Cap Bearings		
Axle Cap Bolts		

ELECTRICAL INSPECTION	√ REPAIRED	√ O.K.
MOTORS (Cont'd)		
Axle Caps		
Frame Bolts		
General Condition		
CONTACTORS, RELAYS AND BREAKERS		
Contact Tips		
Armatures		
Shunts		
Connectors		
Magnet Valves		
Cir. Bkr. Trip.		
Coils		
Arc Boxes & Horns		
General Condition		
WIRING		
Condition		
Packing Glands		
Splices		
Clamps		
Insulation		
HEADLIGHTS		
Lamps		
Reflectors		
Lens		
Packing Glands		
General Condition		
AUXILIARY SWITCHES		
Contacts		
Bearings		
Arc Box		
Blowout Coil		
Connections		
Fuse Clips		
Shunts		
General Condition		
CONTROLLER		
Main Drum		
Fingers		
Segments		
Arc Deflector		

ELECTRICAL INSPECTION	√ REPAIRED	√ O.K.
CONTROLLER (Cont'd)		
Interlocks		
Blowout Coil		
General Condition		
RESISTORS		
Terminals		
Grids or Tubes		
General Condition		
REELS		
Commutator		
Brushholders		
Brushes & Shunts		
Armature		
Bearings		
Fields		
Collector Rings		
Terminals		
Splices (Number)		
General Condition		
REVERSER		
Reverse Drum		
Fingers		
Segments		
Interlocks		
Magnet Valves		
General Condition		
FUSES		
Headlight		
Main		
Control Switch		
Reel		

ELECTRICAL INSPECTION	√ REPAIRED	√ O.K.
FUSES (Cont'd)		
Blower		
Breather		
TROLLEY		
Shoe or Wheel		
Shunts		
Bearings		
Spring		
Bushing		
General Condition		
BLOWERS AND BREATHERS		
Air Connections		
Elec. Connections		
Commutator		
Brushes		
Brushholders		
Bearings		
Air Vents		
Field Coils		
Armature		
General Condition		
BATTERIES AND DETAILS		
Plush Cells		
Equalizing Charge		
Set Ampere Hour Meter		
Cleaned Plug Contacts		
Grease Nut Cups		
Spacers		
Plug & Receptacle Connections		
General Condition		

REMARKS:_____

SIGNED_____
Inspector

Westinghouse Elect. Corp.

GOOD INSPECTION CHARTS as illustrated above are the foundation of any maintenance system.

and conveyor, pump and light controls, should be checked for proper operation and condition. See that wiring and connections are tight and free from corrosion. Defects in control switches slow down the operation and endanger the life of personnel. Make sure that the controls receive a thorough inspection.

The contactor panel should be checked for proper sequencing of operation. Forward and reverse traction motor contactors should be tested for correct series-parallel operation. Make sure that mercury tubes are working properly and are of the same delay for each motor. Each contactor, single and double, should receive an individual inspection. This would include checking the wiring and connections for tightness and corrosion. Contacts should be checked for wear, also for burned and pitted places. Examine shunts for tightness and corrosion. Overload relays should be tested for proper operation and rating. The general condition of the panel should be checked for the presence of dust and moisture. Keep the panel clean and dry.

There are approximately 300 ft of 2- and 6-conductor trees of various wire sizes in a shuttle car. Make sure that the wiring is in good condition. Also, check to see that wiring is in a safe place so as not to get damaged. Junction boxes, which serve to distribute wiring, should be examined, paying close attention to connections and insulation.

Trailing cable and cable-reel collector rings should be looked at frequently. Make sure that the cable has a fused nip with a properly rated fuse. Count the number of splices in the cable and examine their condition. A cable should not have more than six to eight splices to maintain proper voltage at the motor terminals. The end connection of the cable should be made so that it will not be pulled out of the reel in the event all of the cable is unspooled. The collector rings should be inspected once a month for worn rings, faulty insulation and loose connections.

Shuttle cars should have lights at all times. Inspect the resistance and connections for faulty condition. Use a voltmeter to check the voltage being supplied to the light bulbs. Check bulbs and light sockets.

Mechanical Inspection—Mechanical inspection includes the following:

SHUTTLE-CAR TIRES should be inspected daily. See that they have sufficient air pressure and look for damage. Change those found to be bad.

Wheels.
Steering.
Cable reel.
Speed reducer.
Universal drive shafts.
Front axle and trunnion assembly.
Conveyor chain, drive and takeup shaft.

Rims, tires and valves should be checked for damage which could result in a flat tire. Lug bolts and nuts should be tested for tightness. Lug nuts should be adjusted equally so that wheels will be mounted straight. Wheels mounted crooked will "wobble" causing damage to the wheel units and tires.

Steering control segment and bevel pinion should be examined for proper mesh and condition of teeth. Close checks of the linkage including draglinks, cross shaft, steering arms and segments are of the utmost importance. Keep the steering mechanism in top operating condition for maximum performance and safety.

Cable reel sprockets of the drive and spooling device should be checked for wear. Look for worn and broken parts in the drive chains. See that the spooling device is aligned and operating properly. Examine all cable guides and sheaves. These aids to cable spooling prolong the life of the cable. Keep them in good condition.

Speed reducer and wheel drive units should be inspected for worn and loose bearings. Don't fail to check worms and gears for excessive wear whenever possible. Oil seals and gaskets are important. See that they receive close attention. Guard against oil leaks. Overheating and any unusual noise can indicate trouble. Check. Keep all bolts and nuts tight.

Universal drive shafts and couplings should be examined frequently. Make sure that all bolts and nuts are tight. Examine the couplings for wear. Frequent inspections of the couplings will help to prevent downtime.

For a good inspection of the front axle and trunnion assembly, drive the shuttle car to a place that will permit getting under the car. The pivot axle bushings, spacers and front axle pins should be tested for slack and worn parts. The axle-brace assembly bolts should be checked for tightness. Pins, bushing, and spacers of the axle brace should also be examined.

Proper alignment of the conveyor drive and takeup shaft should be checked. Examine bearings and sprockets for wear. Look for bent, broken and missing flights in the chain. See that there are no missing cotter pins and that rollers and connecting links are in good condition.

Hydraulic Inspection — Hydraulic connections should be checked frequently for leaks. Hose condition and

LARGE CAPACITY MINE CARS in use today require scheduled maintenance, such as, proper lubrication and frequent inspections.

PUMPS should be properly installed and well maintained. This is an example of good installation. Daily inspections and well kept records will improve performance.

location are important. Hydraulic hose that has been damaged or become rotten over a period of time results in equipment delays. Any hose that looks as if it might give trouble in the near future should be changed. See that hoses are located in safe places so that they won't be damaged. The storage tank should be covered at all times and the oil filter port screened to prevent foreign matter from entering the tank. The filter of the suction port should be cleaned frequently.

If oil forms in the tank check for leaks that would permit air to enter the system. A bad pump seal, gasket or hose can cause foaming. Steering and boom jacks often develop leaks. A close look will determine if repairs are needed. Take a reading of the output pressure of the hydraulic pump using a gage to see if the pressure is sufficient. Check the relief valve for proper setting. The high and low torque of the cable-reel control valve should be tested. Proper settings are approximately 450 and 150 psi, respectively. Be sure that all control valves are checked for proper operation.

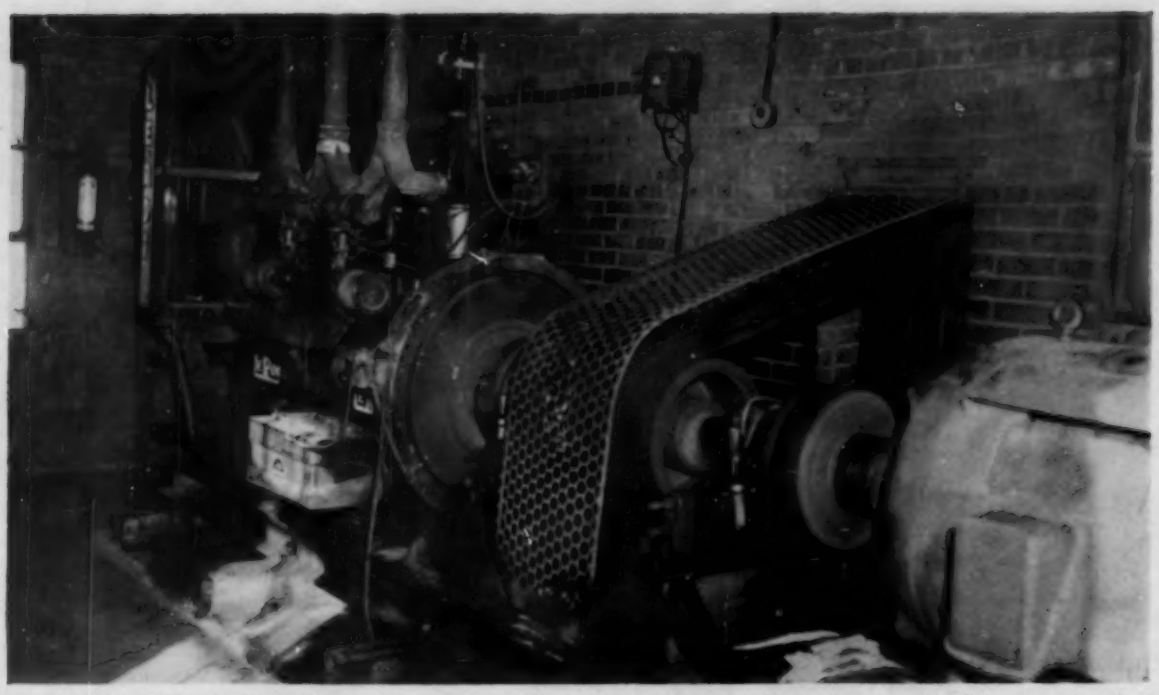
Lubrication—Comply with manufacturer's lubrication recommendations. Check to see that the correct grade of oil is being used in the speed reducers and wheel units. Make sure that they are not overoiled. The zone lubrication system of the car involves checking all grease hoses and fittings. See that all moving parts are being greased properly. Make sure that the hydraulic oil tank is full. Check lubrication record to see if motor bearings are being greased regularly.

Belt-Conveyor Maintenance — Belt conveyors do not require a great deal of maintenance. However, periodic inspections should be made to insure proper operation. Inspection should include the following:

Motor.
Speed reducer.
Controls.
Belt.
Rollers.
Lubrication.

Use a hook-on-type ammeter to determine the motor load. Compare the load with the nameplate rating. If the load is excessive take necessary steps to correct it. Be sure to inspect the motor as outlined previously. The motor coupling should be checked to determine its condition and for proper alignment of the motor and speed reducer.

The speed reducer worm and gear should be checked. Note any excessive wear. Design of reducers may not always permit examining gears. If this is the case, check the amount of takeup-slack in the gears, excessive metal cuttings in the oil and any unusual sounds produced by the reducer. Any of these will indicate possible gear trouble. The sprockets, drive chain and drive-gears of the unit should be checked for wear. Examine the drive chain for proper alignment and tension. Correct align-



AUXILIARY DRIVE UNITS for fans are important. Installations equipped with auxiliaries insure continued fan operation when electric failures occur.

ment and proper mesh of the drive-gears are important. Check.

Various types of controls are employed in operating belt conveyors. Regardless of the type the aims are the same, that is, to start, stop and reverse the belt when necessary. Starters are designed to furnish, through resistance, the proper rate of acceleration for motors. This is accomplished by using a manual controller or an automatic starter. In either case, make sure that the sequence of acceleration is maintained. Detailed inspections of the starting device should be made frequently. On each inspection look for faulty contacts, wiring and connections. Check the resistance to make sure that it is in good condition. Prevent dust and moisture from accumulating in the starter or controller.

Belts should be examined for wear, cuts and breaks. Mechanical splices should be checked and renewed when signs of weakening are evident. Most important in belt maintenance is to see that the belt runs straight. When a belt is found to run crooked every effort should be made to correct it. Make sure that the belt does not run in water. Check all places that water might accumulate. Keep water from dripping on belt. See that belts are not exposed to heat. If belts operate outside make sure that they are protected from the weather.

Belt rollers should be checked frequently. Free-turning rollers will prevent wear and reduce power cost. Don't allow coal to gather around the rollers.

Proper lubrication of rollers will eliminate many belt troubles. Check lubrication records to make sure that rollers are greased regularly. Grease is harmful to belts and over-greasing should be avoided. Over-greasing can destroy the grease seals allowing dust to enter the bearings and resulting in failure.

Chain-Conveyor Inspection—Chain conveyor inspections are similar, in some respects, to those for belts. The motor and speed reducer should be checked in the same manner.

Chain conveyors usually will not operate efficiently at a length of more than 300 ft. If the conveyor exceeds this length make arrangements for tandem operation. Chain trouble will be at a minimum if this rule is followed. All pans should be examined for worn, bent and torn places. Replace any that are likely to cause trouble. Chains should be checked for bent and missing cotter pins. Flights should be equally spaced. Minimize sagging and keep pan lines straight.

Lubrication inspection should consist of checking the motor records to determine if the bearings are greased regularly. The speed reducer should be checked for correct grade and proper oil level. Drive- and tail-shaft bearings also should be checked to see that they are greased regularly.

Track Haulage Equipment

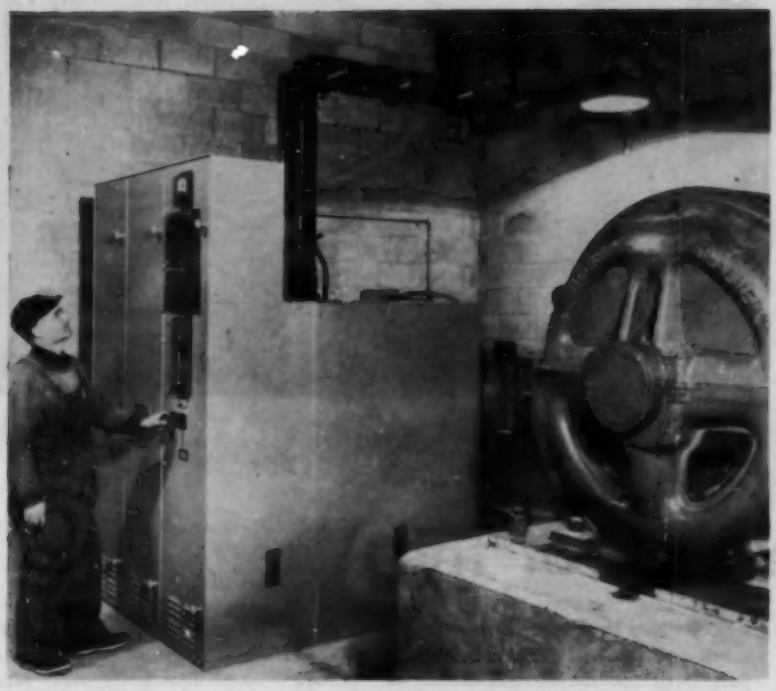
Locomotives—Thorough inspection of a locomotive can best be performed by placing it over the motor pit and removing all guards and covers. This will save time and the inspection can be carried out without interruptions.

The inspection should include all electrical and mechanical items and lubrication.

A check-list is the best means of making sure that all parts are checked. This list should include space for remarks.

Repairs and inspections should be performed during the off-shift. It is not necessary to check all parts at each inspection. Certain parts should be checked weekly, others monthly.

The inspection records, as shown in the accompanying illustration, is a time saver that will aid in making



FAN CONTROLS should be checked frequently. Pay particular attention to relay and meter settings, and contacts. Keep dust and moisture out of control panels.

accurate electrical and mechanical inspections at regular intervals. Using this type of report and making good use of the five senses helps everyone concerned do a better job.

The best check on the lubrication of locomotives is to see that records are kept properly. The record should include the date lubricated, and the type and amount of lubricant used. See that lubrication charts are furnished for each make of locomotive.

Mine Cars—Mine car maintenance warrants careful study. Make sure that adequate facilities are available to take care of all repair work. Don't permit shop-cars to be the cause of "out-of-empty" delays that result in lost tonnage.

Survey the maintenance program. See that cars are greased at regular intervals. Make sure they are inspected periodically. Note conditions of wheels, bearings, bodies and frames.

Maintain an individual record of repairs and lubrication. This can best be accomplished by numbering each car.

Service Equipment

Rockdusters—Rockdusters should be stored in dry places when not in use. Make sure this rule is carried out. Before storing the rockdusters see that they are clean. Remove excess rockdust in hopper, on motor, in starter and blower. Cleanliness plays an important part in the maintenance of rockdusters. Keep them clean.

Motors and starters should be checked periodically. Perform the inspection as outlined previously.

Rockdusters are not used as often as most equipment. For this reason the motor and starter should be protected against dampness. See that heater strips or lamps are installed to keep moisture out.

Again, the importance of cleanliness cannot be over emphasized. The air system should be kept clean and not allowed to clog. Clogging produces a back pressure forcing rockdust into the blower. This causes excessive wear on the blower blades. A buildup of dust inside the blower can stall it. Inform operators of what can happen if it is not kept clean. Make sure that the blower is allowed to run several minutes after the hopper is empty. Check the blower and air lines frequently.

The important check points of the feeder mechanism are seals and bearings. These bearings, even though sealed, are subjected to highly abrasive dust. See that seals are in good condition. Grease bearings often.

Pumps—Keep a maintenance record on each pump. The record should include among other things, the date and time of each inspection and the lubrication procedure. Also, note any repairs. This information can serve two purposes: (1) facilitating inspection by providing a record of previous trouble spots and (2) providing help in determining when the pump should be overhauled through a record of the amount of maintenance necessary to keep it operating.

The main points to consider when checking pumps are lubrication, packing and packing glands, and alignment.

Lubrication is the life of a pump. Care should be taken in selecting the right lubricants and in seeing that they are applied properly.

Conveniently located pumps are often over-greased. It seems that every person that passes gives them a few shots. A record posted at the pump will inform each person that the pump has been serviced.

Packing and packing-glands receive their share of abuse too. Correct procedure for repacking a pump is to remove all the old packing and replace it with new. Usually new packing is just added to the old. Eliminate this practice. Make sure that all concerned know the correct way to repack a pump.

Check the packing and packing-gland adjustment to determine their condition. If the adjustment is out and the packing is leaking excessively have the packing replaced.

Make sure that pump and motor alignment is correct. The suction and discharge lines also should be connected without stress or strain.

Further checking should include examining the suction line for leaks. Make sure that each line contains a foot valve or strainer.

Certain type pumps are equipped with an external clear liquid lubricating system. See that liquid flows freely. Check the lines for clogging.

Fans—Inspect fans frequently. Once a day is not too often. Actually, fans require very little maintenance. Starters, motors and fan bearings should be checked. In most cases minor repairs will keep them in good operating condition.

Be sure that recommended repairs are made quickly. Double check to make sure repairs have been made.

MAINTENANCE MAN OF THE YEAR —J. C. Sweeney, Duquesne Light Co. instructor in electrical maintenance.

BASIC COURSE in electrical maintenance was taught to six-man classes during working hours. Master Mechanic Mike Minnick, who acts as teaching consultant, offers suggestions as mechanic checks circuit systematically.

Maintenance Man of the Year

"I learned that many of the things I had been doing before were wrong."

"I didn't realize that such a complicated circuit could be so simple if you could trace it through."

"It is a pleasure doing repair work now that I know what I am doing."

"I found that bad tube in less than five minutes."

These are typical comments from some of the repairmen who have participated in Duquesne Light Co.'s classroom and laboratory training program in electrical trouble shooting and maintenance. For conducting this course, J. C. (Cliff) Sweeney, assistant shop foreman at Duquesne Light's Warwick mine, was named "Maintenance Man of the Year" by the Mining Electro-Mechanical Maintenance Association. Announcement of the award, first of its kind by MEMMA, was made at the 5th Annual meeting, Uniontown, Pa., Sept. 28.

Training Results

Results of the course show that trouble formerly requiring 2 hr to two shifts to locate and repair now can be handled in 5 to 30 min. Repairmen have confidence in themselves and usually are able to locate the source of trouble in 15 min. Section foremen now have confidence in the mine mechanics, too, and permit them to proceed on their own rather than call the outside shop for help. Another important benefit of the training is that mechanics now are thinking in terms of preventive maintenance. They look for things that will cause trouble if not repaired and report it to the master mechanic. As a result, the number of breakdowns has been cut considerably.

If underground mechanics are unable to locate the trouble in a short time they call Mike Minnick, Warwick's master mechanic, and describe the trouble. He then explains how to go about the job and the men understand what he is talking about. They remain calm and are able to put the machine back into production faster. In the past it was necessary to send a man from the shop to handle the tough maintenance jobs.

Without the benefit of formal education or training in the field of electricity, Cliff Sweeney did a thorough and efficient job in training 57 Warwick employees. The training program was the outgrowth of a series of conferences between Duquesne operating and maintenance officials to discuss ways and means of improving maintenance (*Coal Age*, April, 1957, p 76). M. J. Minnick Jr., master mechanic, assumed personal responsibility for the course but his duties as head of Warwick maintenance did not permit him to teach the class full time.

In looking for someone to teach the 48-hr course, Mr. Minnick remembered that Cliff Sweeney, assistant shop foreman, had been a good student under him for 8 yr in night vocational classes of Penn State's Mineral Industries Extension Services. On the basis of this schooling plus personal contact on the job, Mr. Minnick felt that Mr. Sweeney could handle the job. The result was that A. R. Hood, Warwick superintendent, and Mr. Minnick approached Mr. Sweeney and asked him if he would teach the course. He accepted the challenge and Mr. Minnick agreed to teach the first session on each new topic and serve as consultant throughout the course. For the remainder of the time Cliff was on his own except for periodic visits from Mike to check on class progress.

To prepare himself for the teaching assignment, Mr. Sweeney studied charts and electrical diagrams at home and reviewed the material studied in the night vocational training classes. His task was to teach the theory and practical application of electricity to employees whose education ranged from fourth grade to high school. The goal was to make each man competent enough to be able to trace and understand the most complex electrical circuits on any piece of equipment. Remarks by men who took the training, and less equipment downtime, prove the value of the teaching methods.

Where the Class Meets

A specially equipped room near the surface shop serves as a classroom for the maintenance training. Classes for the initial training of 18 mechanics were limited to six men and were held twice a week from 8 to 11 A.M. This course provided 48 hr of instruction and practical work in electrical

ADVANCE TRAINING, started this fall, is personalized in two-man classes. Instructor Sweeney and Master Mechanic Minnick watch electricians Dan Downey and George Billetz assemble motor without aid of diagram.

theory and troubleshooting. Up to now, 57 men have taken the training.

The classroom, 20x40 ft, is equipped with desks and demonstration bench, and has laboratory benches along two sides. Fluorescent lighting and warm-air heaters contribute to student comfort. There is ample open floor space so that a complete machine can be brought in for testing and checking. Power for test circuits is provided at mine voltage to keep shop conditions as near those underground as possible and avoid problems resulting from voltage differences.

Classroom aids include plenty of blackboard space, wiring diagrams of the various mining machines, film projector, delineascope, screen, films, manufacturers' maintenance manuals, voltmeters, ammeters, wattmeters, mercury tubes, contactors, relays and electrical motors.

What is Taught

The basic course is divided into four major topics: electrical circuits, contactors and relays, DC motors, and wiring diagrams. Since thorough knowledge of electrical circuits is the basis of good maintenance, this topic was studied for the first 9 hr.

In this phase of the training the men worked a wide assortment of problems designed to fit in with underground conditions. For example, voltage always was the same as underground, and the problems were set up on a lightboard circuit so the men could see the relation between volts, amperes and ohms. Meters were connected in the lightboard circuit and the men could work the problem on paper and then check the results on the meters. Various electrical principles, such as voltage drop, could be illustrated readily on the lightboard.

The second part of the training program was devoted to contactors, relays and mercury tubes. All parts of each were studied in detail and the function and adjustments of each component were explained.

Motors were the subject for study in the third part of the training program. Again the various parts were studied first, then the actual installing and connecting of the components to make a motor was carried out.

The fourth stage of the training covered blueprint reading. Men were acquainted with all the symbols before any diagrams were explained. Diagrams were first kept simple, then gradually made more complex. To simplify this part of the training as much as possible, diagrams were projected onto a 7x7-ft screen.

The climax of the training came when the students were taught how to use a wiring diagram in electrical troubleshooting. For example, a panel board for a loading machine was built up from components and put in perfect working order. Members of the class then were given an opportunity to locate and remove faults put on by other members of the class. In his search for the trouble, each man is given a test light, voltmeter, ohmmeter and wiring diagram. He is trained to search systematically for the trouble. The final test of his newly acquired skill comes when a loading machine is brought into the classroom from the mine and troubles are planted in the electrical system. If a man comes through this test with flying colors, he is able to cope with underground problems.

Throughout the course, trainees are required to keep a notebook, including sample problems. To provide a practical as well as theoretical approach, problems were set up with the same values as components in the test circuit on the laboratory bench.

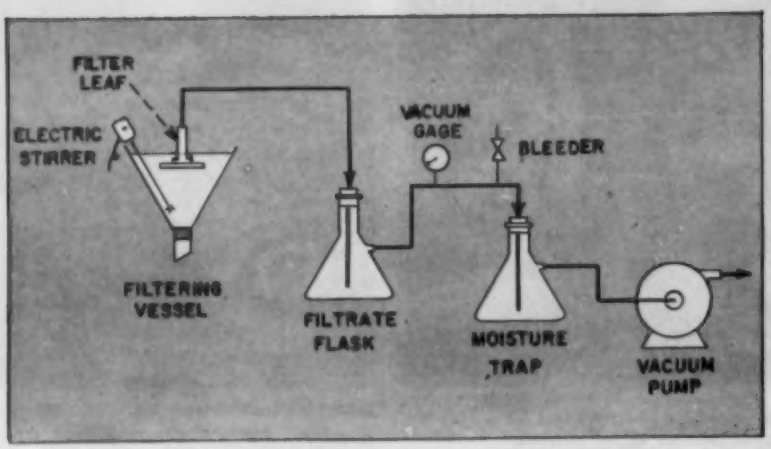
Periodically throughout the course men were tested with multiple choice or true-false tests to measure their achievement and spot any weaknesses in the training program. Men were not graded competitively. In classroom discussions men were not asked questions but volunteering was encouraged. In no case was a man embarrassed because of his lack of knowledge.

After the course was completed, the men were given a vacation from classroom work until the fall of 1957. At that time a review test, made up by Mr. Minnick, was given to all who had taken the course. The purpose of the test was to measure how much each man retained from the course, then plan a specific program for each one. Two men who make comparable scores on the review test are scheduled for advanced training at the same time. Thus training can be tailored to fit their needs.

The review test included making symbols for 25 electrical devices, drawing schematic diagrams, and showing test light placement for 15 different electrical troubles, such as, grounded armature, grounded series field, shorted shunt field and so on.

At the time the writer visited the classroom, the first two men were taking an advanced 9-hr course. Their assignment for that day was to assemble a motor without the aid of a blueprint and then test it. Mr. Sweeney is instructor for the advanced classes and Mr. Minnick drops in from time to time to check on progress or offer suggestions.

If the men prove their proficiency at the end of the advanced course they will move on to training in hydraulics. But if any two men need more than 9 hr advanced training to develop the necessary electrical skills they will continue specialized training in electricity instead of starting training in hydraulics. The goal of the training is to develop competent maintenance men and the company recognizes that all men do not learn at the same rate of speed.



TEST-LEAF filtration apparatus used to determine flocculant effectiveness.

Flocculation Improves Vacuum Filtration

Flocculation will increase filter capacity and do a better job of removing solids from the filtrate.

This study tells how to rate cost and effectiveness in selecting a flocculant for slurry treatment.

By P. S. Jacobsen and J. E. Mauser
Chemists, U. S. Bureau of Mines
Seattle, Wash.

DURING RECENT YEARS, the use of vacuum filtration for recovering fine solids from washery water has become increasingly widespread. Adoption of this process has been brought about largely by two factors: First, stream-pollution legislation has necessitated cleaning up plant effluents; second, wider use of continuous mining machines has increased the load of fine coal to be dealt with in cleaning-plant water circuits, thus requiring improved means for solids recovery.

Filters involve higher investment and operating costs per ton of capacity than most other preparation-plant equipment. Thus anything that increases their capacity offers means for cost reduction.

Flocculation of the coal slurry fed to a filter often will increase capacity, and at the same time improve the quality of the filtrate water. Starch, either plain or pretreated with caustic, has been used for this purpose for several years. More recently, however, a large number of new flocculants has become available. Most of them are either synthetic polymers or gums, and some are so effective that only a few hundredths of a pound is needed per ton of solids. The advent of this new group of flocculants prompted the Bureau of Mines to investigate their effectiveness in improving the filtration of coal slurry, this work being part of a broader program dealing with various phases of liquid-solids separation applicable to coal slurry.

The 15 flocculants shown in Table I were evaluated in terms of their influence on the filterability of a slurry that is particularly difficult to treat in unflocculated form.

As shown by the screen analysis in Table II, this slurry contains a high proportion of extreme fines, and the fines were high in ash content; both factors militate against easy filtration. This particular slurry, which is the underflow of a ½-mm wedge-wire screen in the Black Diamond washery of the Palmer Coking Coal Co., Black Diamond, Wash., was selected because such slurries with high clay content generally are hard to filter and thus offer the possibility of being improved materially by flocculation.

The test-leaf apparatus shown in the accompanying illustration, which is standard equipment for investigating filtration problems, was used in evaluating the flocculants. A sample of flocculated slurry thickened to 40% solids was placed in the pulp vessel, where it was kept in agitation with an electric stirrer. Filtration was then accomplished by immersing the test leaf, covered with one of two standard filter cloths, into the slurry for 48 sec. at a vacuum of 25 in of mercury. The leaf was then removed, and drying under vacuum continued for 66 sec, thus simulating the operation of a commercial filter operating at 3 min per revolution and 26.7% submergence.

The cake and filtrate were weighed, then returned to the vessel, remixed, and filtered again in the same manner. Purpose of the retesting was to evaluate the strength of the flocs formed by each reagent, as some are much stronger than others.

The second trial always gave a lower cake rate, and auxiliary tests showed that about 80% of the reduction was due to floc breakdown, and only 20% was caused by cloth blinding.

Table III shows the filter-cake rates obtained with various flocculant concentrations, using both a fine cloth (polyethylene, PO-801 HF) and a coarse cloth (saran, SA-603). The dry cake rates were calculated by assuming a constant cake-moisture content. With unflocculated slurry the clay sealed the cloth immediately, limiting the cake rate to only 4 lb per hr per sq ft. In contrast, many of the flocculants provided initial cake rates in excess of 200 lb, even with the fine cloth and the minimum reagent concentration of 0.025 lb per ton. In general the flocs formed at this concentration were comparatively weak, and thus the rates obtained in the second trials were much lower. Increasing the flocculant concentration to 0.05 lb per ton provided a distinct increase in initial cake rate with most of the flocculants. Moreover, it created much stronger flocs, as shown by the improved relationship be-

TABLE I—Flocculants Tested

American Cyanamid Co.
- Aerofloc 548
- Aerofloc 552
- Aerofloc 3000
- S-3019
- S-3100

Dow Chemical Co.
- Separan 2610

Armour & Co.
- Ethomeen c/15

Stein, Hall & Co., Inc.
- Potato starch, Idaho
- Tapioca flour, Brazil
- Jaguar 503
- Jaguar MD-A
- Jaguar MD-1

Minnesota Mining & Mfg. Co.
- KH-3
- Kylo 27

Monsanto Chemical Co.
- Lytron 886

TABLE II—Screen Analysis

Size, mesh	Weight, Percent	Ash, Percent
Over 28	6.3	15.9
28 to 48	25.8	18.9
48 to 100	31.7	31.1
100 to 200	16.3	53.6
200 to 0	19.9	77.5

tween the first and second of the two trials.

As would be expected, the cake rates achieved with the coarse cloth were somewhat higher than those obtained with the fine cloth. However, this increase in cake rate was at the expense of filtrate quality. The solids in the filtrates obtained with the fine cloth averaged 0.05%, whereas those with the coarse cloth averaged about 0.5%. Particularly with the coarse cloth, there was a direct correlation between filtrate clarity and completeness of flocculation—the better flocculants gave distinctly cleaner filtrates than the poorer ones.

The moisture content of the cakes obtained from well flocculated slurries were in general about 2% higher than those obtained with the poorer flocculants. This increase is attributable to the influence of the greater cake thickness on moisture removal during the drying cycle.

When tested over a wider range of concentration than that shown in Table III, all flocculants exhibit a maximum effectiveness at some concentration above which flocculation actually decreased. Examples of this phenomenon can be seen in Table III with Type 1 and Type 11, both of which gave lower cake rates at concentrations of 0.10 lb per ton than at 0.05 lb. The concentration required for maximum effectiveness is an individual property, and thus the comparisons shown in Table III would be entirely valid only if all the flocculants were priced the same. Actually, starch is much cheaper than some of the other flocculants, and reaches its maximum effectiveness at a much higher concentration. At 1.0 lb per ton starch gave an initial cake rate of 250 lb per hr per sq ft with the fine cloth and 390 lb with the coarse, thus rivaling the rates obtained with the best flocculants at lower concentration. Naturally, both effectiveness and cost must be considered in selecting a flocculant for a particular application, and the time-honored flocculant of the coal industry—causticized starch—is not necessarily obsolete.

Each slurry can be expected to react individually toward flocculation, its behavior depending upon the surface properties of the coal, the amount and nature of the impurities, and size composition; even the acidity of the water can be important. Some slurries are benefited greatly, others are not. Flocculation thus is not a panacea for filtration problems, but it does offer a means of reducing filtration costs in individual cases, and on this basis warrants consideration.

TABLE III—Test-Leaf Cake Rates Obtained With Flocculants

	Dry cake rate, pounds per hour per square foot							
	Fine filter medium[1]				Coarse filter medium[2]			
Flocculant	0.00[3]	0.025[3]	0.05[3]	0.10[3]	0.00[3]	0.025[3]	0.05[3]	0.10[3]
None	4	—	—	—	11	—	—	—
Type 1								
Trial 1	—	175	229	203	—	216	292	322
Trial 2	—	32	134	175	—	111	210	239
Type 2								
Trial 1	—	194	216	234	—	210	234	322
Trial 2	—	37	106	165	—	122	181	234
Type 3								
Trial 1	—	78	210	306	—	92	322	467
Trial 2	—	5	27	170	—	22	108	224
Type 4								
Trial 1	—	239	306	343	—	277	343	343
Trial 2	—	142	216	250	—	213	244	343
Type 5								
Trial 1	—	229	306	343	—	265	322	365
Trial 2	—	125	216	256	—	199	277	343
Type 6								
Trial 1	—	213	306	365	—	306	390	425
Trial 2	—	94	210	256	—	213	322	365
Type 7								
Trial 1	—	167	224	256	—	213	250	343
Trial 2	—	88	146	181	—	175	191	292
Type 8								
Trial 1	—	156	216	244	—	239	322	390
Trial 2	—	26	149	167	—	175	250	277
Type 9								
Trial 1	—	229	256	265	—	306	306	292
Trial 2	—	138	186	213	—	229	250	292
Type 10								
Trial 1	—	91	191	234	—	210	256	365
Trial 2	—	6	43	145	—	87	165	234
Type 11								
Trial 1	—	206	203	181	—	256	244	203
Trial 2	—	75	138	161	—	165	203	203
Type 12								
Trial 1	—	322	390	467	—	322	425	491
Trial 2	—	56	265	390	—	210	343	390
Type 13								
Trial 1	—	—	2	2	—	—	16	16
Trial 2	—	—	1	1	—	—	8	7
Potato starch, Idaho								
Trial 1	—	3	66	167	—	42	123	229
Trial 2	—	2	3	25	—	20	37	127
Tapioca flour, Brazil								
Trial 1	—	5	23	131	—	22	93	188
Trial 2	—	1	2	9	—	9	18	105

[1]Polyethylene cloth, PO-801 HF. [2]Saran cloth, SA-603. [3]Pounds per ton of dry solids.

How to

By Stratton Hammon
Vibration Damage Specialists, Louisville, Ky.

IF YOU should have to go to court to defend a suit for damages alleged to have resulted from your blasting operations, what kind of a situation might you encounter? And what should be your defense?

As to what you might encounter, consider the fact that a judge has refused to admit the testimony of an admitted expert but accepted the guesses of a local parson with no experience whatever. It has actually happened. As to your best defense, it is to be able to prove not that your blasting operations couldn't have caused the damage, but that the damage was actually from another cause, and to prove it in such a way that judge and jury will accept it.

The problem is a growing one. Those engaged in strip mining have always been irritated by damage claims resulting from their operations. But the steady increase in population, combined with a new awareness that large damages are possible in successful court actions, have removed the irritation from the minor to the major status. Claims against a particular operation have been known to accumulate overnight like a swarm of locust and total in the millions, causing serious financial complications. We have had one case where the claims total exceeded the total insurance coverage ten times.

Underground mining, which has been almost immune from this trouble, is beginning to come in for its share of attention from the claims-conscious section of the public. There is a rash of claims, for instance, in Manhattan as a result of the building of the third tube of the Lincoln Tunnel. One of these, which we are

Handle Blast-Damage Problems

Positive evidence as to the real cause of damage, presented by qualified, experienced experts, the best defense to claims. Increased attention to the problem the best method of heading them off.

servicing, amounts to almost a million dollars on one building.

Yesterday and Today

In the past the defense of the mining industry against these claims has been rather haphazard with, as might be expected, haphazard results. "Experts" were retained who were expert in only one department of the tectonic knowledge necessary to properly prepare a defense with counsel. Usually these were seismologists who were understandably without qualifications in construction, but since the damage was claimed to structures this latter experience was more important than the former. Sometimes the defense swung over completely to construction and relied upon a local contractor as a witness, but here again was hampered by his lack of knowledge of explosive engineering and seismology.

Considering how unprepared it was the mining industry has until recently done fairly well in this type of litigation. This was mainly because the plaintiffs have exerted even less effort to put together a well prepared case. But this situation is rapidly changing. The following example will illustrate the point.

We were called into the Eastern Kentucky fields near the Virginia border. A claims situation had arisen in which two suits had already been filed and about 50 more claims were pending, waiting upon the outcome of the first two suits. Inspection of the two houses alleged to be damaged disclosed that there had been no damage from the blasting. Instead it was the natural result of age and poor construction. The distances were ½ mi to the closest and ¾ mi to the farthest. Payment was denied and organization of the defense was begun.

This consisted of recording the earth vibrations from the blasting; recording also the everyday vibrations created in these houses by trains, trucks, and walking; minute inspection in each instance of damage claimed and tracing each to its true structural cause; close study of the blasting methods; and finally the organization of all this complicated technical evidence into the precise forms required by the rules of evidence and easily understandable by the attorneys, judge and jury. For what does it profit a man if he gains all the technical proof in the world and loses his case?

The first suit to be tried lasted eight days. The plaintiff testified and his neighbors testified, all avoiding the natural normal explanation for the damage. We used the mine owner, his drilling and loading foreman, the explosive manufacturer's representative, and myself. The damages claimed amounted to $10,000 and the jury, in the end, returned a verdict entirely in our favor.

The local attorneys watched the proceedings closely and noted that the jury, which included four miners, was not impressed by the fantastic tales told by the plaintiff of the damaging power of dynamite at 4,000 ft, especially when these tales were refuted in detail by several specialists who knew both explosives and buildings.

When the next trial came up, negligence was charged in the form of drunkeness of the foreman, and the services of a local engineer were obtained to testify and advise the plaintiff's counsel. This trial lasted seven days, during 2½ of which I personally testified in an effort to refute the very unusual findings of my opponent engineer as to the effects of explosives at such distances.

The Burden of Defense

After a day and a half of direct examination my testimony came to an end on Friday at 5 pm and the court adjourned until Monday morning. This meant that my opponents would have the entire weekend in which to pore over the books and dig up authorities with which to work me over when my cross-examination began. Their engineer knew just enough engineering and just little enough about explosives to put together some theories which, while unscientific, were nevertheless embarrassingly difficult to refute in the restricted manner in which one is allowed to explain things in court. Knowing what was coming I spent the entire weekend marshalling authorities to endorse the points of my testimony. All were covered except the question of the effect of delay caps. I had maintained that delay caps reduced the magnitude of the vibrations emanating from the explosion. Bureau of Mines Bulletin 442 was published before the modern delay cap was perfected and hence the pronouncements of this booklet in this one respect are not competent in regard to the present-day cap. None of my books gave a positive statement about this matter. But being in a mining community I looked

for *Coal Age* and found the 1956 *Coal Age* Mining Guidebook, issued in Mid-July. Reading through the pages I found this statement by the editor: "The MS-delay connector has become a valuable tool in reducing vibration—in many instances to about 25% of that with the usual shot." Here was the positive statement I needed!

Sure enough, when Monday came around and I found myself on the witness stand my list of authorities was sufficient to break down all attempts to discredit my previous testimony. Finally the plaintiff's attorney played his ace and said: "I defy you to find one positive statement by one authority that delay blasting caps reduce vibration." When I read the editor's statement from *Coal Age* it just about finished the trial, for the magazine is much respected in that mining town.

The damages asked were $12,000 and the jury returned a verdict for $1,200, which satisfied us, especially since we had lost one of our best witnesses by death between the first and second trials. This verdict had the desired effect on the remaining scores of claims. Notice, however, how quickly the opposition learned to improve their technique and give us more trouble in the second trial. If we had not also had miners on the second jury, who could not be fed wild tales about explosives, we might well have lost the entire $12,000.

The old methods will no longer suffice unless one is willing to take a wild gamble with company money. Seismograms are taken and read by too many people who do not quite know what they are about. We have seen reports on seismograms by supposed experts which gave a safe answer when the seismograph plainly indicated danger. Some competent men, in an effort to cover more ground and do more business, even send seismographs out by express. The operator records the blast and then returns the instrument to the specialist for reading. This procedure, in my opinion, would be useless in a court of law. Indeed, it might act as a detriment under the onslaught of a smart, hard-hitting opposing attorney. Worst of all a highly qualified construction man, such as an architect and structural engineer, is seldom used to trace the alleged damage to its real source.

Positive Evidence the Need

This latter is most important under the law since positive evidence, stating what did cause the damage, has far more weight than negative evidence, stating what did not cause the damage. Best of all is to present both kinds of evidence. To do this properly the specialist must be an architect, a structural engineer, an explosive engineer and a seismologist and he must have personally inspected the mining operations, taken the seismograms, inspected the structures allegedly damaged, made all the calculations and reports, and conferred at length with the attorneys in organizing the case. There is nothing which can take the place of wide training and experience and close personal participation in the immediate problem at hand, from the beginning to the end.

Even with all this there is still another important ability which the specialist must possess. He must be a good witness. He must be able to put across his story, must be able to convince the jury of the scientific truths about explosives as he himself is convinced. Unfortunately most professional men make poor witnesses, since it is usually the nature of their profession to believe that all that is needed is to prove a scientific fact. Courts are little concerned with scientific facts and will sometime refuse to allow them to be presented or, if allowed, will give them no more credibility than the imaginings of some totally incompetent witness. Hence, it is necessary to "sell" the jury on the facts you have gathered. If done carefully and properly, with attention to the rules of evidence, it is surprising how well they will follow you.

Some operators carry their own insurance and must handle the defense of damage claims on their own. We have worked for some companies, especially in Arkansas and Texas, who have their own legal departments and can thus work out a positive program and follow it. Most operators, however, do carry insurance and are prone to shrug the whole thing off and leave it to their insurance company. If losses result the check is soon picked up by the mining industry, for insurance premiums must be adjusted by the actuaries from time to time to reflect the real loss situation. Otherwise, the insurance companies would not last long since they operate on such narrow margins.

It would pay off handsomely for the mining industry if they would become actively interested in this matter and work in closer cooperation with the insurance companies on the prevention as well as the correction of claims. In addition to an expert legal defense, for example, another effective step in increasing the efficiency of blast-damage control is the pre-survey made by qualified specialists.

The pre-survey consists of a detailed examination of all structures that might be affected by blasting operations, including those at considerable distances even, since if the blast can be heard even faintly, or the owner, knowing blasting is going on, can assert damage, there is the possibility of a claim. The specialist in vibration also can contribute in other vital directions, such as:

Inspection and evaluation of damage claims by qualified experts, meaning registered architect-engineers.

Consultation and advice on the prevention of claims, including a check on blasting methods by explosives engineers, calculations by seismologists, and proper public relations.

Measurement of vibrations by seismographs or electronic sound analyzers.

Legal testimony and consultation with counsel by expert witnesses, as recounted in this article, when claims result in litigation.

Investigation to determine the origin of any variety of explosion, fire, water damage or other phenomenon.

Evaluation of vibration and noise connected with commercial equipment and recommendations for their reduction.

Planning and design of structures to minimize vibration.

From the blasting standpoint, the handsomeness of the return from increased attention to damage control and defense of claims can be judged from the fact that today we are servicing claims totalling almost a quarter of a billion dollars!

How SCPA Sees Coal Today and Tomorrow

Results of the past year, problems and opportunities of the future and discussion of special problems feature 16th annual meeting.

CONTINUED LEADERSHIP—Joseph E. Moody, re-elected president of the Southern Coal Producers' Association.

SPECIAL PRESENTATIONS on the European fuel situation and on tomorrow's coal picture in the United States supplemented reports of officers and staff at the 16th annual meeting of the Southern Coal Producers' Association, Huntington, W. Va., Nov. 1. Other events included a luncheon address by Victor Riesel on "National Labor Problems" and a discussion of "The Collapse of Time" at the annual banquet by J. Lewis Powell, Office of the Secretary of Defense, Washington, D. C. W. W. Goldsmith, president, Big Sandy-Elkhorn Coal Operators' Association, presided at the luncheon; Charles R. Bourland, president, The New River Co., was chairman of the special presentations session; and Charles E. Lawall, vice president, Chesapeake & Ohio Ry., was toastmaster at the banquet.

Subject to elections yet to be held in two instances, the board of directors was confirmed as previously constituted. Members are:

Pearl Bassham, president, Harlan-Wallins Coal Corp., Verda, Ky.

Wm. Beury, Algoma, W. Va.

Charles R. Bourland, president, The New River Co., Mount Hope, W. Va.

John E. Davis, vice president, Guyan Eagle Coal Co., Amherstdale, W. Va.

John J. Foster, vice president, Island Creek Coal Co., Huntington, W. Va.

David L. Francis, president, The Powellton Coal Co., Huntington.

W. W. Goldsmith, president, Floyd County Coal Corp., Charleston, W. Va.

Patrick C. Graney, vice president, Sterling Smokeless Coal Co., Mt. Hope.

Charles S. Guthrie, Harlan Fuel Co., Yancey, Ky.

C. A. Hamill, president, Sycamore Coal Co., Huntington.

Harry S. Homan, Southern Appalachian Coal Operators' Association, Knoxville.

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report

Frank L. Hornickel, president, Anchor Coal Co., Cleveland.

Harry LaViers, president, South-East Coal Co., Paintsville, Ky.

H. C. Livingston, president, Truax-Traer Coal Co., Chicago, Ill.

A. R. Matthews, president, Pocahontas Fuel Co., Inc., Pittsburgh.

John Mayhew, vice president, Blue Diamond Coal Co., Knoxville.

James G. McCurry, vice president, Imperial Smokeless Coal Co., Quinwood, W. Va.

Frank M. Medaris, president, Harvey Coal Co., Harveyton, Ky.

W. T. Ray, Monterey, Tenn.

L. Newton Thomas, president, The Carbon Fuel Co., Charleston.

L. E. Tierney, president, Eastern Coal Corp., Bluefield, W. Va.

Leonard J. Timms, general manager, New River & Pocahontas Consolidated Coal Co., Berwind, W. Va.

Wade W. Walker, president, Ashland Mining Corp., Bluefield.

Henry F. Warden, vice president, Pocahontas Fuel Co., Inc., Bluefield.

L. E. Woods Jr., president, Crystal Block Coal & Coke Co., Huntington.

The board in turn re-elected the officers of the organization for another year, as follows:

President—Joseph E. Moody, Washington, D. C.

Secretary—Walter R. Thurmond, Charleston, W. Va.

Treasurer—L. E. Tierney, Bluefield, W. Va.

Reports of officers and staff were the major feature of the business session. Topics included were the following:

Legal Problems

A memorandum covering waivers of responsibility, as by representatives of the union investigating accidents, has been prepared setting out the responsibilities of all parties and is now available for distribution.

Recent developments now provide employers with two weapons for combating wildcat strikes and other contract violations. First, the employer can go to NLRB for relief or, second, he can go directly to the U. S. Courts for direct action. As a result of these developments, growing out of the conduct of the Boone County and Westmoreland Coal cases, the climate has changed to one somewhat more favorable to the employer—**W. F. Howe**, SCPA counsel.

Safety Developments

Some 1,250 mines are included in the National Roof-Fall Campaign and, except for small mines employing 15 men or less, preliminary reports indicate that excellent results are being attained. Bonding of mine roof by injecting an adhesive is showing considerable promise, but more work is necessary.

An auger-mining safety code has been developed and eventually will be made official. Promising results are being registered in tests of fans and tubing for ventilating deep places. Equally promising results are expected from foam-plug fire-fighting tests by the Bureau of Mines. Other safety developments include fireproof thermoplastic trailing cables now being tested, the possibility that good nonflammable hydraulic fluids will be available at competitive costs early in 1958, and the possibility that a viscous material sprayed on the surfaces in mine openings to trap dust can replace rock dust—**James B. Benson**, SCPA safety director.

The U. S. Coal Outlook

"I am glad to say that not too many unexpected things have happened in our industry this year, for the unexpected oftentimes has a way of being unpleasant. Comparatively speaking, the bituminous coal industry is having a fairly good year, with production in 1957 close to the 500 million tons mined in 1956. Exports, of particular importance to our own Southern region have held up pretty well. The total, including Canada, will be well above the approximately 69 million tons of last year. The overseas market, which took such a jump in 1956, could exceed last year by 10 million tons. As we go into the holiday season, we have reason for optimism, but none for complacency."—**Mr. Moody.**

The SCPA Year

"In the fiscal year 1956-7 coal companies holding membership in the Southern Coal Producers' Association mined and marketed almost exactly the same tonnage that was produced in the previous fiscal year 1955-6, and from identical mines. The association has neither gained nor lost membership during the last year. Companies operated their mines on an average of 235 days against 239 for 1955-6 and had a productivity record of 10 tons plus per man day.

"There were no national or district strikes and so-called 'wildcat strikes' were fewer in number, and fewer man-days were lost than in any previous year since this association has been in operation. Labor-management relations were good."—**Mr. Thurmond.**

Exports

"The permanency of the European market has been one of our biggest question marks. All the information we have leads us to believe that there will be a continuing demand for coal which should approximate shipments of last year and this. At the same time, let us not forget that the price at the site of consumption most times determines whether we can hold a market or lose it. . . . I would recommend a thorough and systematic market study, accompanied by appropriate action, to be certain that we do keep it and other overseas markets too. We know, for example, that unloading facilities for coal in Europe are inadequate. Financing also is inadequate, insurance rates are too high, and too little has been done toward merchandising and identifying our quality coal."—**Mr. Moody.**

The Domestic Market

"The expansion of domestic markets is even more important to the overall industry than the export market. Here, too, I think we have furnished an instance of what can be done. The Suez crisis and the resultant hikes in the price of oil gave us an opportunity to look into the Florida market. We were told by some persons that it was a pipe dream. Nevertheless, through the cooperation of the railroads and the utility industry in Florida, the market for coal in Florida has increased and may develop into a major bituminous outlet.

"The leaders in coal then might consider an inquiry into every area which promises the consumption of more coal in this country and abroad. I think I can foresee the time when there is a greatly expanded market for coal through the use of electricity to heat and cool residences. I believe this expansion can be promoted without in any way replacing coal in any existing market."—**Mr. Moody.**

Transportation

"Along with wages, the steady rise in transportation costs has put a heavy burden on coal's attempts to compete. In this connection the railroads have their problems too. It is our responsibility to keep the rail leaders informed of the effect of freight rate increases upon our industry, since coal is the biggest single item which the railroads carry.

"We have a further responsibility. In the Florida instance, we gave the railroads a lot of factual data which pretty well indicated what their rates could be if we were to cooperate in developing a market for coal in that State. The reduction in rates, quite substantial by the way, followed. If we keep the railroads informed, with facts, we may find they are willing to cooperate not only to keep markets we have now, but to reach out for important new markets for coal."—**Mr. Moody.**

Competition

"Not all our problems involve greater efficiency, cheaper transportation, or new developments. The dumping of gas and residual oil costs coal millions of tons annually. To be truthful, I do not think this dumping is sound business for either the gas or oil industry, but thus far we have not been able to get them to stop it. Nor have we been able to persuade our legislators that they should stop it. We must keep on trying. We must be sure that Washington knows what coal wants and is sympathetic with these wants. We've got a lot of power if we use it right, for, to put it bluntly, coal—potentially speaking—has the votes. When we take into account our working relationship with the United Mine Workers, this is doubly true, as in some matters of great importance Mr. Lewis and his union have gone down the line with us."—**Mr. Moody.**

Supplies and Depreciation

"In mechanically operated mines, supplies have become a major item of expense. Where not many years ago they only accounted for a few cents per ton and a very small percentage of total cost they are now, due in large measure to mechanization, costing on the average $1.10 per ton produced exclusive of purchased power, and, account for 20% of the total cost . . .

"If there is an industry operating in any field that needs to give diligent attention to its depreciation account it is bituminous coal. It is pleasing to note that on the average such charges are being revised upward and are now greater than they were a year ago."—**Mr. Thurmond.**

Mining Cost Trends

"At this point it might be well to discuss very briefly the trend of cost in both Dist. 7 and Dist. 8. These costs have consistently advanced. Notwithstanding the large capital outlays for machinery bringing about improvement in operating economies, increased pay to miners has offset the effect of both new equipment and a greater operating efficiency . . .

Total Cost Per Ton

	District 7	District 8
First 6 mo 1955...	$5.35	$4.62
First 6 mo 1956...	5.70	4.91
First 6 mo 1957...	6.25	5.25

"It may be noted that this increase is primarily due to the fact that during the period miners' wages were increased $4 per day and vacation pay by 38¢ per day. The supply account advanced by 27¢ per ton in Dist. 7 and 23¢ in Dist. 8—almost exactly 30%. These three items are almost wholly responsible for the increased cost. Increased productivity has not kept pace with increase in labor costs. In this race between cost and productivity, it is productivity that has lost. Just what can be done toward reversing this trend in cost is a problem to be reckoned with. I do not believe that the ultimate in productivity has been attained.

"Technological improvements are not at an end but will continue to move forward. They will increase productivity and would if the wage structure remained constant or was lowered, reduce cost, but I do not know what the wage structure will be. I do not believe any one else knows. It is coal's greatest problem and invites more serious attention than you have given.

"While there are operating improvements on one hand there are offsetting wage increases on the other; therefore, we have been unable to achieve a position where profits are such as those to

which coal is justly entitled. Today margins are too thin for an equitable return on investment."—**Mr. Thurmond.**

Realization

"Generally in the last 2 yr realization has been better. True some mines have been on the red side of the ledger. Such will always be true for about 10% to 15% of the mines regardless of price or wage structure. There are other mines that have operated on a very thin margin entirely incommensurate with their investment. Still others have done pretty well, although I do not believe that any producers have obtained a price nearly as high as that which the quality of their coal and their ability to serve the market merits. The following table gives an insight to what you have obtained for your coal—the percentage that has been sold to each consumer group and the price each group paid . . .

Sales, First Eight Months, By Producers Reporting Cost and Realization Data

District No. 7	% Total Sales Reported	Average Realization Per Ton
Met. & By-Product	33.2	$6.76
Electric Utility	3.9	5.29
Export	23.7	7.04
All Other:		
Lump	0.9	8.12
Double Scr. & Stoker	17.7	7.76
R. O. M.	1.3	7.57
Resultant—All Sizes	19.3	6.85
Total	100.0	$6.99
District No. 8—Preliminary		
Met. & By-Product	23.3	5.78
Electric Utility	8.9	4.22
Export	22.9	5.60
All Other:		
Lump	2.6	6.98
Double Scr. & Stoker	18.8	6.10
R. O. M.	1.4	5.30
Resultant—All Sizes	22.1	4.78
Total	100.0	$5.46

"You will note a great disparity between the price obtained for utility coal and coal sold to other consumer groups. Utility coal in the low volatile area was sold for $1.47 less than metallurgical, $1.75 less than export and $1.70 below the average of all sales. It sold for 99¢ below cost of production. In the high-volatile area utility coal sold for $1.56 less than metallurgical coal, $1.38 less than export and $1.24 less than average of all sales. It sold for $1.02 below cost of production . . .

"Unless this situation is reversed and utilities are required to pay a fair price, as other industries do, you will have to seek other markets in order to profitably operate. In fact, most of the coals of our areas are of such quality and so limited in reserves that they should not be used under boilers but should go for higher uses."—**Mr. Thurmond.**

Planning Ahead

"Now may we ask ourselves the question, what will be the market's requirements of the next decade? Will it grow at such a rapid rate as to reach those fantastic tonnages, predicted by enthusiastic optimists—tonnages running even in some forecasts to more than a billion tons in 1975? I think not. Will it mark time or go backward as predicted by some confirmed pessimists? I think not. I do not adhere to either of these predictions. Neither do I want to make a forecast myself . . . However, I do want to make some observations.

"The general economy of the country has for several decades moved upward at a rate of about 3% annually. In recent years this has been due to an inflationary movement more than to an actual physical increase in goods and services. Coal production is affected by physical output, not by inflation, and it usually lags the increase of general economy.

"If I were operating a coal property and laying plans for the future I would not plan for a faster average increase than 2% per annum.

"A 2% annual increase would mean a market for about 600 million tons in 1967. Such planning would insure an operating capacity that would meet market requirements and at the same time not tie up an undue amount of capital in costly and fast depreciating machinery."—**Mr. Thurmond.**

Coal and Government

"For many years the bituminous coal industry has suffered at the hands of the government. Under the Roosevelt reign the administration was so heavily weighted favorable to labor that coal had to put forth a constant effort just to live—much less live profitably. . . . Under the Truman administration the principles of the Roosevelt policy continued . . .

"When President Eisenhower was elected we looked forward with hope and confidence but our hope has turned to doubt and our confidence almost to despair. Cooperating firmly with big oil and with gas his administration has given those two competitors aid and comfort in their effort to destroy coal as a major energy producer of the country and to the marked injury of the independent oil producers . . .

"If coal is not deeply submerged by these competitors it will require not only the combined efforts of the industry itself, both management and labor, but the efforts of every other industry and business depending upon the production and sale of coal. Your congressmen must be contacted by you and others of their constituents. It is not enough that your associations alone shall fight these battles, but you too, as individual producers must gird yourselves for the attack."—**Mr. Thurmond.**

Coal's Job

"We are pursuing a reasoned and intelligent course. We are aiming, in each instance, at clearly defined goals and objectives. Overall we are seeking to maintain and improve coal's position in the whole broad scheme of things.

"First of all, we believe that to do this coal must be articulate. Coal must speak for itself from the marketplace, in the halls of government. Coal must have its voice in the councils of the industries it serves, as well as the industries serving it.

"On this premise we are seeking always to maintain and improve communications with industries with which we are allied. We know, for example, that what happens to the railroads has got to affect us. Railroads are the carriers of our commodity.

"In similar fashion what happens to the utilities of this country is of concern to us. They are our biggest customers. Here at least part of the problem is private industry vs. socialized subsidized government power supply.

"What happens to the economy of Europe, as you all know, is of vital concern to us. Fifty million tons of our market was realized there last year and more this year.

"What happens in the oil industry is vital to us, be it by government edict or regulation or what happens by natural economic development. In Florida we are attempting to capitalize an internal economic development to advantage.

"What happens to the natural gas industry is of the greatest concern to us. As an up-to-the-minute example before us we have the matter of natural-gas entry into the Plains states.

"These are but a few simple examples but they illustrate my thesis here today.

"We are pursuing a course to insure and improve coal's situation on the premise, I repeat, that nothing just happens. People make things happen.

"Our competitors, our friends, and our government all operate in recognition of that principle. They are acting to cause things to happen. My assurance to you here today is that we are doing what we are doing in the conviction that coal is the best custodian of its own destiny."—**Mr. Moody.**

Coal for Europe

Over 40% of the coal production of southern West Virginia now goes to

(*Continued on p 162*)

HAULAGE, AUGERING, ACCIDENT PREVENTION—H. J. Dusz (left), Ohio Div. of Mines; William Kebblish, Mathies Coal Co.; Charles Ferguson, UMWA; G. H. Sambrook, U. S. Steel Corp., chairman, Coal Mining Sec.; Arthur Bradbury, Inland Steel Co.; L. W. Schuler, UMWA; H. F. Weaver, USBM; and C. A. Purcell, Indiana Bureau of Mines & Mining.

45th National Safety Congress

Roof control with bonding substances, effects of corrosive electrolysis on roof bolts, planer mining, safety in development, haulage, augering, dust collection are highlights.

ROOF CONTROL with bonding substances, the effects of corrosive electrolysis on roof bolts, safety and operating problems of a modern haulage system, safety features in the design and development of Ireland mine, and dust collection at the face with continuous mining were major topics at meetings of the Coal Mining Sec. of the National Safety Congress at the group's 45th annual meeting in Chicago, Oct. 21-23.

Discussions also featured talks on mining with the coal planer, how to auger mine safely, a cooperative program in accident prevention and a resume of gas ignitions and fires in coal mines since enactment of the Federal Coal Mine Safety Act.

New section officers for 1957 were elected as follows:

Chairman: George Sambrook, director of mine inspection, Coal Div., U. S. Steel.

First vice chairman—L. H. Johnson, U. S. Bureau of Mines, Pittsburgh, Pa.

Second vice chairman—Joshua Smith, Eastern Gas & Fuel Associates, Mt. Hope, W. Va.

Secretary—H. F. Weaver, chief, coal mine inspection division, USBM, Washington, D. C.

Charles Ferguson, director, safety division, UMWA, Washington, D. C., retiring general chairman, presided at the sessions on Monday and Tuesday; George Sambrook, incoming chairman, at the Wednesday session.

Speakers and their subjects on Monday were: E. R. Maize, mining methods research engineer, USBM, Pittsburgh, Pa., a progress report on cementation of coal-mine roof; J. M. Muchnok, electrical inspector, Pennsylvania Department of Mines & Mineral Industries, Hopwood, Pa., the effects of corrosive electrolysis on metallic roof bolts; and R. J. Marrs, general safety inspector, Eastern Gas & Fuel Associates, Welch, W. Va., mining with the coal planer.

DEVELOPMENT, DUST COLLECTION, FIRES—G. W. McCaa (left), Hanna Coal Co.; R. J. Wacht, Joy Mfg. Co.; and H. F. Weaver, USBM.

Roof Cementation

"After a great deal of investigation and review of reports of fatalities, the conclusion was reached that an attempt should be made to further strengthen coal-mine roof in place, since roof-bolting had given such favorable results. It was conceived that it might be possible to strengthen the roof over passageways and possibly the roof in advance of a face, if a high-strength adhesive material could be injected into the bedding

ROOF CONTROL, CORROSION, COAL PLANER—E. R. Maize (left), USBM; J. M. Muchnok, Pennsylvania Dept. of Mines & Minerals; R. J. Marrs, Eastern Gas & Fuel Associates; and Charles Ferguson, UWMA, retiring chairman.

planes of the roof strata to bond the stratum, thus preventing lateral shifting and increasing the strength of the structure as a whole," said Mr. Maize in keynoting his report on roof cementation.

The proposed method of strengthening roof with a bonding material may be compared to the process of making plywood, wherein thin, structurally weak layers of wood are bonded together to form a member that is stronger than a like thickness of solid wood, Mr. Maize explained.

Early work included tests to determine if fluids under pressure could be injected into mine roof. Following successful oil penetration of roof strata in commercial mines in two coal beds, the next problem was to find a material that, having been pumped into the stratum, would band the layers together and form a plate or beam. Investigations indicated that an epoxy resin appeared to have the desired properties of low viscosity, rapid setting time in thin layers, and high adhesion and cohesion.

The first injection test of the epoxy resin was made on Jan. 7, 1957, in an area of the Renton mine of the National Mines Corp. Crossbars supporting roof in the test area were removed on the first shift of operations and the area was dangered off following pumping. The area was standing intact without roof falls up to Sept. 6, 1957.

The second test was made in an area two blocks away from the first test. The purpose of this test was to determine the effectiveness of the resin in stopping a fissure. Up to the date of the report, Mr. Maize said the area remained stable, with no further fissuring.

The third was in an area where the normal roof conditions were extremely

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bad. Normal support included bolts on 4-ft centers and in many instances steel crossbars set on 5-ft centers were needed for reinforcement. In the test site the normal bolting was discontinued and crossbars were spaced 3 ft apart. Resin was injected in two 1⅛-in holes, 4 ft deep, after each cut of coal was removed. A total of 179 gal of resin was injected in two entries and a crosscut for a total distance of 140 ft.

The test work proved that resins could be injected easily into roof strata over entries in the Upper Freeport coal. Flow pattern of the resin has not been accurately determined. And the depth of penetration over solid coal is unknown. But the work indicates favorable results can be obtained, Mr. Maize concluded.

Effects of Electrolysis on Roof Bolts

The corrosion of metallic bolts by electrolysis is a chemical decay under environmental influences in which nature reverses the processes by which man gets his construction materials from their natural source, Mr. Muchnok said. Unless certain precautions are taken, corrosion can be a continuous process that can ultimately cause serious damage to roof bolts.

The two conditions that cause the most difficulty in underground corrosion of bolts are stress and concentration cells. A little corrosion with cyclic stress will considerably reduce the endurance of the metal. Concentrated cells and stress tend to speed the rate of corrosion. The combined action of stress and corrosion is called corrosion fatigue, Mr. Mucknok explained.

Deterioration of metals may be prevented or reduced in three ways:

1. By using a more resistant metal.
2. By applying a suitable coating.
3. By making the environment less corrosive.

The Coal Planer and Safety

Some of the safety features in planer mining that have proven to be advantageous over other types of mining at Stotesbury, Mr. Marrs said, are:

1. Timbering and roof control.
2. Ventilation and mine gases.
3. Coal dust and rock dusting.
4. Explosives and blasting.
5. Electricity.
6. Communication.
7. Planning.

On the subject of roof control, Mr. Marrs said that for the area of roof exposed, a planer face when timbered to company standards is better protected than in most other types of mining. Ventilation is simplified by a positive current at all times without the use of line curtains. Only 6,000 to 8,000 cfm are needed to adequately ventilate the face and keep the methane content at ½ of 1%. Positive pressure is maintained against the gob line toward a bleeder and a return entry.

Practically all coal dust accumulations are eliminated by close pillar falls. Suspended dust is at a minimum because the plowing action of the planer permits coal to turn over gently on the panline. Hazards connected with explosives and blasting are eliminated since none are used, Mr. Marrs added.

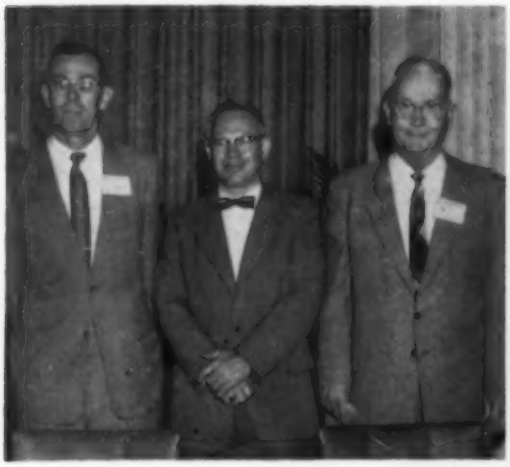
All electric cables are installed in double channel irons bolted to the conveyor line. This greatly decreases the possibility of short circuits, electric shock and cable fires. Communication across the face is by nonflare lights installed 20 to 25 ft apart. Telephones are installed at both head and tail sections, Mr. Marrs remarked.

While one face retreats, another set of headings is driven with bleeders established at the back end of the new area. A complete standby plow unit is completely repaired and set up in the new area while the other unit retreats. This provides ample time to make a move, set up, and test the equipment before the new section is put in operation. Thus the changeover to a new area is orderly, Mr. Marrs said.

Safety in Modern Haulage

Lead-off speaker at the Tuesday session was William Kebblish, production engineer, Mathies Coal Co., Pittsburgh,

(*Continued on p 164*)



EXPLOSIONS, BOLT RECOVERY—H. R. Stelzriede (left), Freeman Coal Mining Co., session chairman; C. B. McIntosh, Eastern Illinois State University, Charleston, Ill.; L. W. Kelly, U. S. Bureau of Mines, Vincennes, Ind.

BELTS, PREPARATION, BLASTING—M. W. Mellor, McNally Pittsburg Mfg. Corp.; T. P. Rhodes, Peabody Coal Co.; R. F. Knobloch, U. S. Rubber Co.; F. W. Parrott, E. I. du Pont de Nemours & Co. Inc.; and E. J. O'Brien, Heyl & Patterson, session chairman.

Safety, preparation and overburden blasting hold spotlight as . . .

Illinois Mining Institute Holds 65th Annual Meeting

NEARLY 500 registrants gathered in Springfield, Ill., Oct. 18, for the annual meeting of the Illinois Mining Institute. The effect of weather conditions on explosive elements in coal mines, roof-bolt recovery in the Middle West, safety features in belt conveyor operation, fine-coal cleaning and use of ammonium-nitrate blasting agents in strip mining highlighted the one-day meeting.

In a short business meeting, the following officers and new directors were elected:

President—H. C. Livingston, vice president, Truax-Traer Coal Co., Chicago, Ill.

Vice President—A. G. Gossard, vice president and general manager, Snow Hill Coal Corp.

Secretary-Treasurer—George Wilson, head, Education Extension Div., Illinois Geological Survey, Urbana, Ill. (re-elected).

Directors—J. A. Bottomley, Sahara Coal Co., Inc., Harrisburg, Ill.; J. W. Broadway, Bell & Zoller Coal Co., Chicago, Ill.; A. P. Mossman, Peabody Coal Co., St. Louis, Mo.; and R. H. Swallow, vice president and chief engineer, Ayrshire Collieries Corp., Indianapolis, Ind.

Reporting on the scholarship program, Dr. Thomas Read, head, Dept. of Mining and Metallurgical Engineering, University of Illinois, expressed appreciation for boosting scholarship awards from $400 to $500 per year. He also reported that the Old Ben Coal Corp. had started a scholarship program in which $500 will be awarded each year up to a total of four scholarships. Sahara Coal Co. has set up a similar program, to begin next year with a $500 award.

IMI OFFICERS—A. G. Gossard (left), Snow Hill Coal Corp., vice president-elect; George M. Wilson, Illinois Geological Survey, secretary-treasurer; and Paul Halbersleben, Sahara Coal Co., Inc., retiring president.

In other reports on mining engineering education Dr. George Clark, Dept. of Mining Engineering, Missouri School of Mines, said that there was a slight increase percentagewise in mining engineering students. Of the 135 students enrolled, 30 are from Illinois. Dean W. H. Everett, University of Illinois, pointed out the difficulty of getting research funds in mining and showed the relation between student interest and research programs in a specific field. B. H. Schull reported on production and the safety record in Illinois for the first 9 mo of 1957.

Speakers at the morning session were: C. B. McIntosh, associate professor of geography, Eastern Illinois State University, Charleston, Ill., on the effect of weather conditions on explosive elements in coal mines; and L. W. Kelly, roof control specialist, District E, U. S. Bureau of Mines, Vincennes, Ind., on roof-bolt recovery in the Middle West. H. R. Stelzriede, Freeman Coal Mining Co., was session chairman.

Weather and Explosions

Field research in two Illinois mines plus a study of over 400 major coal

mine explosions and the weather conditions associated with 385 of them were combined to determine the effect of weather conditions on explosive elements in coal mines, Mr. McIntosh said. The first step in the field study was to determine the relationship between methane content in mine air and atmospheric pressure. Samples were taken in summer, winter and autumn. Results of tests showed that whenever there was a drop in atmospheric pressure, there was an increase in the quantity of methane in the mine air.

Other studies of anthracite and bituminous explosions showed that atmospheric pressure was rising on 50% or more of the days when a bituminous explosion occurred. Thus, Mr. McIntosh said, if a relation exists between barometric pressure and bituminous explosions, the association relates explosions to a rising pressure and decreasing methane content rather than a falling barometer and an increase in methane.

A rising barometer indicates post-frontal weather conditions, Mr. McIntosh explained, and these were studied to determine their effect on coal-dust moisture. Results showed that moisture loss was about 7% in 24 to 32 hr after invasion of cold, dry air. Other studies indicated that the quantity of moisture withdrawn in one day in January differs little from one day following an April cold front. Thus practically the same changes in moisture conditions in a mine may be observed within a few hours as in an average seasonal change from summer to winter.

A study of mine explosions showed that the period between the time of the cold front passing and time of explosion is marked in all cases by (1) a rise in atmospheric pressure and (2) a sharp fall in vapor pressure.

In forecasting methane content in autumn, Mr. McIntosh said average atmospheric pressure in Illinois increased. This should result in a buildup of methane in natural storage areas. As a result, the first deep low pressure should release a greater volume of methane than might be expected from a similar low later. Thus the first deep autumn change should receive special consideration.

Roof-Bolt Recovery

The problem of installing bolts has been solved, Mr. Kelly said, and now it is a question of getting the bolts out safely and successfully. One mine in Illinois, operating in the 72-in No. 6 bed and having bad roof, successfully recovers bolts by hand. The immediate variable layer of roof is soft shale and is overlain by limestone. Expansion bolts, ranging from 18 to 72 in, are installed with 4x4x¼-in plates and 2x8x18-in wooden blocks. Three bolts are installed in a set and sets are spaced 5 ft apart. Bolts are recovered in 22-ft rooms only.

Two men, protected by four screw jacks, use a 15-in crescent wrench to loosen the bolt. After about six turns, the bolt is struck sharply with a hammer to drive the expansion plug up, freeing the shell. The bolt is then screwed out of the nut and recovered. A special hook is then inserted and the shell withdrawn. When a jack is removed, the practice is to loosen it a little and listen. If the men hear nothing, they remove the jack and reset it at a new set of bolts, Mr. Kelly said.

Two men recover 290 bolts, plates and blocks and 260 expansion shells on a shift. The value of a ¾x30-in bolt with 4x4x¼-in plate, expansion shell and plug, and 2x8x18-in block is $0.78. Thus two men at $20.04 a shift, recovering 290 bolt assemblies and 260 expansion shells in one shift, save $179.52 for one day's work, Mr. Kelly added.

At other mines, a recovery machine designed and constructed by James Martin, general superintendent, Truax-Traer Coal Co. is used. The unit normally is operated by two men but a third man is sometimes employed on a shuttle car or mobile truck to gather and transport bolts to room necks or the shop. Results show that savings per day range from $159.88 to $617.86, depending on the length of bolts. There have been no lost-time injuries in 5 yr experience with this machine, Mr. Kelly declared.

To prevent accidents in roof-bolt recovery, Mr. Kelly suggested the following rules:

1. Assign practical and experienced men to the job.
2. Provide adequate temporary support.
3. Once recovery crews are established, do not change them.
4. Use a long hook to pull the extracted bolt back under supported roof.
5. Do not try to recover expansion plugs when the recovery machine is used.
6. Have each recovered bolt cleaned with a wire brush, oiled and examined.
7. If threads are worn, discard the bolt or saw off the damaged threads.
8. If bolt heads are being rounded, use a special socket on the recovery machine.
9. Recover bolts as quickly as possible after a place is mined out.
10. Do not recover bolts in a section where mining is being carried on nearby. Noise may make it difficult for recovery men to hear roof movements.
11. The recovery crew should consist of at least two men.
12. When possible, bolts should be recovered on an odd shift or idle day when everything is quiet.
13. Recovery men should be instructed to use their own judgement and if there is the slightest doubt in their minds as to the safety, bolts should be left in.
14. Unsealed areas from which bolts are recovered should be barricaded and marked plainly.

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At the afternoon session, highlights were a discussion of safety features in belt conveyor operation, by R. F. Knobloch, Midwest belt engineer, U. S. Rubber Co., Chicago, Ill.; fine coal cleaning, by T. P. Rhodes, preparation engineer, Illinois Div., Peabody Coal Co., Freeburg, Ill.; and use of ammonium nitrate blasting agents in strip mine operation, by F. W. Parrott, manager of technical services section, Explosives Div., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. E. J. O'Brien, Heyl & Patterson, was session chairman.

Safety and Belts

Replacement of other haulage methods with belts cannot and will not guarantee accident-free operation, Mr. Knobloch warned in his talk on safety features in belt operation. A sound fire-prevention policy is one of the basic factors in implementing an accident-free program. To minimize conveyor belt fires, the program should be separated in the following three divisions:

1. Accelerated use of fire-resistant belt, either neoprene or PVC.
2. Fire prevention.
3. Fire protection.

A complete description of the fire prevention program and fire protection methods described were published in an article by Mr. Knobloch in the August, 1957 issue of *Coal Age*, p 76.

Fine-Coal Cleaning

Fine-coal treatment in any preparation plant is usually the most difficult problem that the operator has to cope with, Mr. Rhodes said. It not only is important that the basic cleaning unit be capable of delivering a saleable product with a minimum of loss to refuse, but the auxiliary equipment and operating problems must be reduced to a minimum. The feldspar jig alleviates or overcomes many of the difficulties connected with the fine-coal handling problem.

The feldspar jig is not a recent development, Mr. Rhodes continued. It is now being installed in a majority of plants throughout many foreign countries. Most installations are for coal no larger than ⅜ or ¼x0, with capacity ranging from 15 to 150 tph in a single unit. A wide variety exists in types of

(*Continued on p 166*)

FRANK SMITH (left), retiring president, KMI; G. G. Grieve; R. C. Collier; B. F. Reed; Aubin Higgins; Charles W. Rountree Jr.; E. D. Slone; Gilbert Ingram; Carroll F. Hardy, and James H. Phalan.

Technical and Merchandising Problems

Continuous mining, merchandising, supervisory incentives, compensation costs, hydraulic fluid and AC power underground are topics at 18th annual meeting of Kentucky Mining Institute, at Lexington.

A WELL-ROUNDED PROGRAM, including papers on mining methods, personnel administration, mine services, product research and safety, featured the 18th annual meeting of Kentucky Mining Institute, Lexington, Ky., Oct. 31-Nov. 1, with Frank Smith, Blue Diamond Coal Co., Leatherwood, Ky., KMI president in charge. In the business session which closed the two-day meeting, members elected officers as follows:

President—Norman Yarborough, chief engineer, U. S. Steel Corp., Lynch, Ky.

First Vice President—B. F. Reed, president, Turner Elkhorn Mining Co., Drift, Ky.

Second Vice President—H. B. Jones, general manager, Eastern Coal Corp., Slone, Ky.

Third Vice President—Edwin McGaw, general superintendent, West Kentucky Coal Co., Madisonville, Ky.

Secretary-Treasurer—James H. Phalan, chief, Kentucky Dept. of Mines & Minerals, Lexington, Ky.

Directors were chosen as follows:

William Crawford, Princess Elkhorn Coal Co.; H. O. Zimmerman, Inland Steel Co.; R. D. Jones, Kentland Elkhorn Coal Co.; R. V. Venable, Feds Creek Coal Co.; Frank Smith, Blue Diamond Coal Co.; J. H. Graham, Jewell Ridge Coal Co.; B. W. Whitfield III, Harlan Collieries Co.; E. B. Taylor, High Splint Coal Co.; S. A. Fox, Blue Diamond Coal Co.; R. L. Nichols, Black Star Coal Co.; Harold Kirkpatrick, Beech Creek Coal Co.; Herman Knight, West Kentucky Coal Co.

Supervisory Incentives

Leading off in the Thursday technical session, C. W. Rountree Jr., director of industrial engineering, Island Creek Coal Co., Holden, W. Va., ruled out the "Christmas bonus" and "profit-sharing" as true incentive plans because the bonus is dispensed without regard to individual job performance.

The type of incentive plan that can be applied to supervisory employees and fulfills the qualifications of a true plan is one in which the supervisor is measured through direct application of standards to the work performed by men under his supervision.

Advantages of such a plan, Mr. Rountree said, are that the supervisor benefits from elevation of his ability through his own efforts. He receives formal recognition of performance which enhances his chances of promotion, and gets an answer to the question: "How am I doing in my work?"

Factors to be considered in setting up the plan are:

1. **Standards must provide equity,** and to do this, they must be developed from time studies made by competent personnel.

2. **Provision must be made** for evaluating the effect of varying conditions at all mines.

3. **Those supervisory positions** which are to participate in the plan must be determined according to the contribution each position makes to improved performance.

4. **Decision must be reached** as to whether standards are to be set for all conceivable duties or on a general basis.

5. **Controls must be developed** to prevent deterioration of all other factors in a sole desire for production.

6. **Capable people** must be employed to install and administer the plan. Some pitfalls to be avoided, are:

1. **Failure to properly sell** incentive plan and to keep it sold.

2. **Deterioration of safety**—cannot be tolerated.

3. **Use of incentive plans** "whip" for production—a misapplication.

4. **Partiality in application** of standards—must be ruled out.

5. **Flagrant use of adjustments,** weakening the plan and undermining confidence in it.

Mining and Marketing

Carroll F. Hardy, managing director, Bituminous Coal Institute, Washington,

C. S. CONRAD (left); J. J. Slomer; S. P. Polack; R. M. Fleming; T. T. Pattison, and Norman Yarborough, president-elect, KMI.

Aired at KMI Sessions

D. C., in expressing his appreciation for his third opportunity to address KMI, pointed out that such interest in marketing is not always evident among mining men. Mining and marketing are not ends unto themselves, Mr. Hardy declared in explaining that the industry must be strong in all its members to remain competitively strong.

In setting forth the main function of BCI, Mr. Hardy said that the group is organized to provide good consumer service based upon sound engineering principles. It is working to improve coal's position in the heating and steam-generation markets.

The primary target of BCI's program is the commercial and industrial markets with emphasis on new construction—precisely where oil and gas have trained their biggest guns.

Turning to ways coal producers may help the program, Mr. Hardy said one of the major customer complaints is lack of uniformity in quality, size consist or appearance. Thus good preparation is of utmost importance.

Roof Safety Campaign

"I hardly need to remind you of the seriousness of the roof-safety problem," G. G. Grieve, National Safety Council, Chicago, declared.

"Of course progress has been made in solving it, but during the past several years efforts toward further improvement seem to meet a brick wall. 1957 is no exception.

"Currently, funerals due to roof falls are conducted at a rate of from 15 to 30 a month. Doctors and hospitals are getting new roof-fall patients at a monthly rate of from 200 to 300.

"The plain fact is that the coal industry is never going to achieve safety records comparable with other industries until roof-fall accidents can be prevented."

In describing the national campaign to reduce roof-fall injuries and fatalities (see *Coal Age*, July, 1957, p 64), Mr. Grieve reported that approximately 1,250 mines now have enrolled.

Continuous Pillaring

Closing feature of the Thursday program was a symposium on pillar extraction with continuous mining machines by E. D. Slone, mining engineer, Lynch Dist., U. S. Steel Corp., Lynch, Ky.; R. C. Collier, superintendent, Mine No. 22, Bethlehem Mines Corp., Jenkins, Ky.; and Gilbert Ingram, mining engineer, Bell & Zoller Coal & Coke Co., Johnston City, Ill.

Mr. Slone, in explaining the system in Lynch Dist. mines, noted that U. S. Steel uses the Joy 1CM, Jeffrey 76-AM Colmol and Lee-Norse CM-33X, each selected for operation under specified mining conditions. The four Joys operate in the 66-in High Splint seam, the two Colmols in the 40-in "B," or Marker, seam and the three Lee-Norse units in the "C" seam. One Joy and Lee-Norse

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are used as rotation units to permit scheduled maintenance of similar machines. The Colmols are spelled off by a conventional unit.

The Joy machines are used with extensible belts and bridge conveyors to mine 2,000 x 3,000-ft sections. The three machines advance the pilot headings to the 3,000-ft limit, drive rooms 1,000 ft from one side and extract pillars. Room development leaves 49x100-ft blocks of coal which are mined by pocket-and-wing methods. Recovery is about 90% and good pillar falls have been the rule. The rate of continuous methods compared favorably with conventional mining, and with about half the manpower.

With Colmols, four headings are driven 18 ft wide on 50-ft centers to a depth of 2,000 ft. With headings completed 27-ft rooms are driven on 50-ft centers on retreat to a depth of 300 ft from the belt entry. The pillars between pairs of rooms are taken by making passes at 60 deg through the pillars. All other turns are 90 deg.

The Lee-Norse units recover barrier pillars by driving three headings through the barrier and developing 53 x 63-ft blocks. Final extraction is made by fender-and-wing methods. An open room is maintained outby the production operation to provide an escapeway and extra shuttle car road.

Mr. Collier explained that the Colmols at Jenkins are used only on retreat work because penetration on retreat is 20 in per min and only 9 in per min in solid work. Development in this hard coal is done by conventional units. Such use of the continuous machines results in lower bit costs and improves visibility and ventilation.

Projections are laid out so that if the roof is well bolted during development, the pillars can be safely extracted using only straight posts for support.

Performance at Jenkins in this retreat work for a 1-yr period was reported by Mr. Collier as follows:

Average Time Per Shift:	July 1, 1956-June 30, 1957 Minutes	% of Total
Net available operating time	321	67
Miner breakdown	27	6
Other delays	46	10
Other work	26	5
Lunch and travel	60	12
Total	480	100
Breakdown, Percent of Time		
Mechanical		18
Electrical		20
Hydraulic		56
Other		6
Total		100
Clean tons per unit-shift	164	
Clean tons per man-shift (operating shifts only)	32.8	

(*Continued on p 168*)

ELECTRONIC COMPUTING, BLASTING—J. D. Reilly (left), vice president, Hanna Coal Co.; J. E. Brown Jr., project engineer, BCR, and J. L. Schroder, chief engineer, Gary District, U. S. Steel Corp.

GAS-WELL PILLARS—George J. Donaldson, mining engineer, Peoples Natural Gas Co., Pittsburgh, Pa.

Central Appalachian Section, AIME, and West Virginia Institute survey

New Operating Techniques

Electronic computing, safer blasting, gas-well protection and continuous mining are center-stage themes at joint meeting at the Greenbrier.

ELECTRONIC COMPUTATION of survey traverses, new developments in ammonium-nitrate blasting agents and design of protective pillars around gas wells were major themes at the joint annual meeting of the Central Appalachian Section, AIME, and the West Virginia Coal Mining Institute at White Sulphur Springs, W. Va., Nov. 8-9. Speakers at the meeting also surveyed European coal production, aspects of taxation and coal recovery with continuous-mining machines.

Chairman of the opening session on Friday morning was John L. Schroder, chief engineer, U. S. Steel Corp., Gary, W. Va., assisted by Fred R. Toothman, Chesapeake & Ohio Ry., Huntington, W. Va. Lead-off speaker was James E. Brown Jr., project engineer, Bituminous Coal Research, Inc., Bluefield, W. Va., on the use of electronic computation in mining applications.

TAXATION—H. B. Fernald (left), Loomis, Suffern & Fernald; George O. Tarleton, Pittsburgh Consolidation Coal Co., and C. W. Porterfield, Pocahontas Fuel Co.

Computing Traverses

Information from surveyor's field notes becomes input information for an IBM-650 computer when this field data is key-punched into IBM cards, Mr. Brown explained, in describing how traverses are calculated on the new equipment at Pocahontas Fuel Co. The information punched into the cards from the notes includes the mine number and survey number, the station number, azimuth, vertical angle and slope distance. One card is made up for each station.

These input cards are then fed into the reading mechanism of the computer and the survey is calculated at a rate of 100 stations per minute. In 1/100th of a minute the computer does the following:

1. Checks mine numbers and survey numbers of each station to make an identity check.
2. Generates the cosine of the vertical angle.
3. Multiplies the cosine of the vertical angle by the slope distance to reduce it to horizontal distance.
4. Generates the cosine of the azimuth angle, multiplies it by the horizontal distance to develop the latitude, and updates the cumulative latitude coordinate.
5. Generates the sine of the azimuth

MINING, ACCOUNTING—R. L. Chambers (left), Pocahontas Fuel Co.; William Laird, Eastern Gas & Fuel Associates; C. W. Porterfield; D. F. Crickmer, Pocahontas Land Co., and R. Glenn Lazzell, Island Creek Coal Co.

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angle, multiplies it by the horizontal distance to develop the departure, and updates the cumulative departure coordinate.

6. Converts the azimuth to a bearing.
7. Automatically feeds in the card for the next station.

In calculating the traverse at 100 stations per minute the computer in 1 min does the work equivalent of one man-day.

The output of the computer is fed into a tabulator, which produces a printed form containing the following:

1. Mine, survey and station numbers.
2. Azimuth.
3. Bearing.
4. Horizontal distance.
5. Latitude.
6. Departure.
7. Coordinate of latitude.
8. Coordinate of departure.

The advantages claimed for the computer at Pocahontas are (1) existing jobs can be done faster, (2) more work can be taken on in accounting and statistical analysis, (3) other equipment can be eliminated, (4) personnel needs are kept to a minimum and (5) paper cost is significantly reduced, Mr. Brown said.

Explosives For Stripping

The search for safer, lower cost explosives was the subject of a paper by James D. Reilly, vice president, Hanna Coal Co., Cadiz, Ohio. Over the years Hanna Coal Company officials and engineers have conducted continuous research in the development of blasting agents for breaking overburden. In one instance, Hanna officials worked with a group from the Bureau of Mines on the development of a combination of ammonium nitrate, carbon black, and liquid oxygen. In other experiments, liquid oxygen and fuel oil were combined. And in still others, different mixtures of ammonium nitrate and fuel oil were tried. After a number of years of successful use of liquid oxygen, an accident occurred in which four men lost their lives. Mr. Reilly suggests that perhaps they had become too familiar with liquid oxygen and no reason was ever found for the explosion. It was then that Hanna officials decided to put full effort into the development of an ammonium nitrate agent. One of the problems was developing a blasting agent with sufficient reaction speed to provide good breakage. It was found that ammonium nitrate alone reacted at an equivalent speed of 2,000 fps. By adding fuel oil the speed was raised to about 4,000 fps. The next step was to use a large-diameter Primacord as detonator. This continuous detonation throughout the charge has the effect of raising reaction speed to about 6,000 fps.

The Hanna operations consume about 10 million lb per yr of explosives, opening possibilities for substantial savings in cost and making a large contribution to safety. Formerly, in using LOX, it was possible to charge only about two holes at a time and it was necessary to prepare and deliver the LOX on a tight schedule. Now, it is possible to deliver a week's supply of the ammonium nitrate agent to the pit in a single trailer load.

Ammonium Nitrate Underground

In discussion, Gerald von Stroh, director of mining research, BCR, set forth the possibilities of using ammonium nitrate underground in what might be called an explosive-type continuous mining machine. When mixed with wood flour ammonium nitrate is a flexible, stable explosive. It is BCR's idea to provide a type of gun having a 2-in bore built into a coal drill. After each

(*Continued on p 170*)

1958 Officers . . . West Virginia CMI

President—George McCaa, general manager, Hanna Coal Co., Moundsville, W. Va.

Vice Presidents—R. G. Lazzell, research engineer, Island Creek Coal Co., Huntington, W. Va.; **S. D. Brady Jr.,** coal department, Baltimore & Ohio RR., Summersville, W. Va.; **H. G. Kennedy,** executive vice president, Kanawha Coal Operators Association, Charleston, W. Va.; **H. E. Mauck,** general superintendent, Olga Coal Co., Coalwood, W. Va., and **Stephen Canonico,** president, Compass Coal Co., Clarksburg, W. Va.

Secretary-Treasurer—G. R. Spindler, head, Dept. of Mining Engineering, University of West Virginia, Morgantown (reelected).

Executive Board: C. R. Bourland, president, New River Co., Mount Hope; **J. F. Trotter,** president, Trotter Coal Co., Morgantown, W. Va.; **Arch Alexander,** Charleston, W. Va.; **H. E. Quenon,** general manager, Eastern Gas & Fuel Associates, Beckley, W. Va.; **Roland C. Luther,** executive vice president, Peerless Coal & Coke Co., Bluefield, W. Va., and **C. R. Nailler,** president, Christopher Coal Co., Osage, W. Va. Mr. Nailler is retiring president of the institute.

Central Appalachian Section, AIME

Chairman—H. O. Zimmerman, manager of mines, Inland Steel Co., Wheelwright, Ky.

Vice Chairman—Carel Robinson, Robinson & Robinson, Charleston, W. Va.; **D. A. Zegeer,** division superintendent, Elkhorn Div., Bethlehem Mines Corp., Jenkins, Ky., and **W. J. Skewes,** chief engineer, Pocahontas Fuel Co., Pocahontas, Va.

Secretary-Treasurer—C. T. Holland, head, Dept. of Mining Engineering, Virginia Polytechnic Institute, Blacksburg, Va.

Executive Committee— F. R. Toothman, coal department, Chesapeake & Ohio R.R., Huntington, W. Va.; **R. M. Allen,** French Coal Co., Bluefield, W. Va.; **E. V. Bowman,** Epperly, W. Va., and **O. S. Batten,** Pikeville, Ky.

Independent Mineral Producers Meet on Problems and Progress

Stream-pollution regulations, the BCI program, and the erection and operation of the Mountaineer shovel themes of Nov. 14 session at Pittsburgh.

INDUSTRY MEETING—
A Special *Coal Age* Staff-Written Report

ELECTION OF OFFICERS and a dinner session were features of the 1957 meeting of the Independent Mineral Producers Association of Pennsylvania in addition to the technical session. Officers were chosen as follows:

President—**William L. Harger,** Sunbeam Coal Corp., N. Washington, Pa., succeeding **William L. Altvater,** Pittsburgh & Shawmut Coal Co., Kittanning, Pa., who became chairman of the board of directors.

Vice President—**Clifford Turner,** Turner Bros., Harrisville, Pa.

Executive Vice President (re-elected)—**Franklin H. Mohney,** Butler, Pa.

Secretary-Treasurer (re-elected)—**J. P. McFarlane,** Butler, Pa.

Members of the board of directors, in addition to Messrs Harger, Altvater and Turner, are:

Paul Boyles, Boyles Coal & Supply Co.

C. H. Snyder, C. H. Snyder Co.

Harry W. Findlay, West Freedom Mining Co.

Raymond R. Bowie, Bowie Coal Sales

Allen R. Davidson, Maple Hill Coal Co.

Robert Carson, Rochester & Pittsburgh Coal Co.

James Anderson, Tri-County Fuel Co.

Walter Coyer, Coyer Coal Co.

John Chutz, Chutz Bros. Coal Co.

A. D. Grasso, Grasso Coal Mining Co.

Emil Lucas, Lucas Mining Corp.

Stream-Pollution Regulations

Reviewing recent developments in regulations of the Sanitary Water Board of Pennsylvania affecting coal-mining operations, Robert Trace, deputy attorney general, noted that the rate of violations in the past year was the lowest in more than 5 yr. He called attention to the new 2-yr limit on mine-drainage permits, a new application question designed to show who will actually do the mining, considerations affecting assignment of permits, and surrender procedure. In the course of his discussion he noted that the Sanitary Water Board now believes that it is theoretically possible to operate mines without discharging acid to streams.

The BCI Program

Noting that Bituminous Coal Institute had passed its first milestone Oct. 1, Victor Lehtoranto, market-research director pointed out that it already had marked up real achievements in protecting markets and bringing in new business. Its three major aims are (1) rendering sound, helpful engineering assistance to users and potential users, (2) determining the extent of coal's possible markets and (3) getting faster and wider acceptance of coal by advertising and public relations.

The target is the 150-million-ton market represented by the heating and process-steam requirements of industrial and commercial establishments and institutions. This market, incidentally, is the most vulnerable from the standpoint of oil and gas competition. He urged wider support and participation in the program.

Market research, Mr. Lehtoranto continued, is a rather new and promising activity aimed at finding out just where and what coal's possibilities are. Using as an example a recent study—the first of 18—of the food and kindred products industry, he pointed out that such studies permit coal to concentrate where the best chances of getting business are. BCI, he concluded, "is trying to sell coal."

The Mountaineer

Presenting a colored movie showing the erection of the 60-yd Mountaineer shovel, James Ault, Hanna Coal Co. director of industrial relations, and Warren Moss, editor, *Hanna Coal News,* summarized the improvements achieved in the design of the shovel as follows:

1. Wide use of high-alloy steels in dipper, handle, booms, etc., for higher capacity with greater strength and less weight.

2. Major increases in speed of motors to speed up all motions and thus permit higher production in overburden of 90 ft or more.

3. Design of the machine to achieve maximum bail pull at top speed.

4. Major increase in speed of lowering dipper.

5. Major increase in the carrying capacity of the bearing plate, made of 2 5/16-in alloy steel machined in place.

6. Installation of automatic three-passenger elevator in hollow center shaft.

The goal in design was over 1½ million cu yd per mo. In the first 10 mo of 1957, the Mountaineer moved 16,673,000 cu yd in bank averaging 77½ ft with an average cycle time of 52 sec. This compares to 13,000,000 cu yd by a 46-yd short-boom unit operating in 43-ft bank with an average cycle of 56 sec. Best month for the Mountaineer was August, when it operated 96% of the available time and moved 2,087,000 cu yd in 82-ft bank with an average cycle of 50 sec.

Coming in *Coal Age* . . .

The editors of *Coal Age* will continue to bring to you in your 1958 issues a planned program of articles from the field on production methods, "think" pieces on industry problems and opportunities, useful information on cost-cutting ideas and better management, and up-to-date news accounts of developments that are of importance to you. Watch for these features in the January issue:

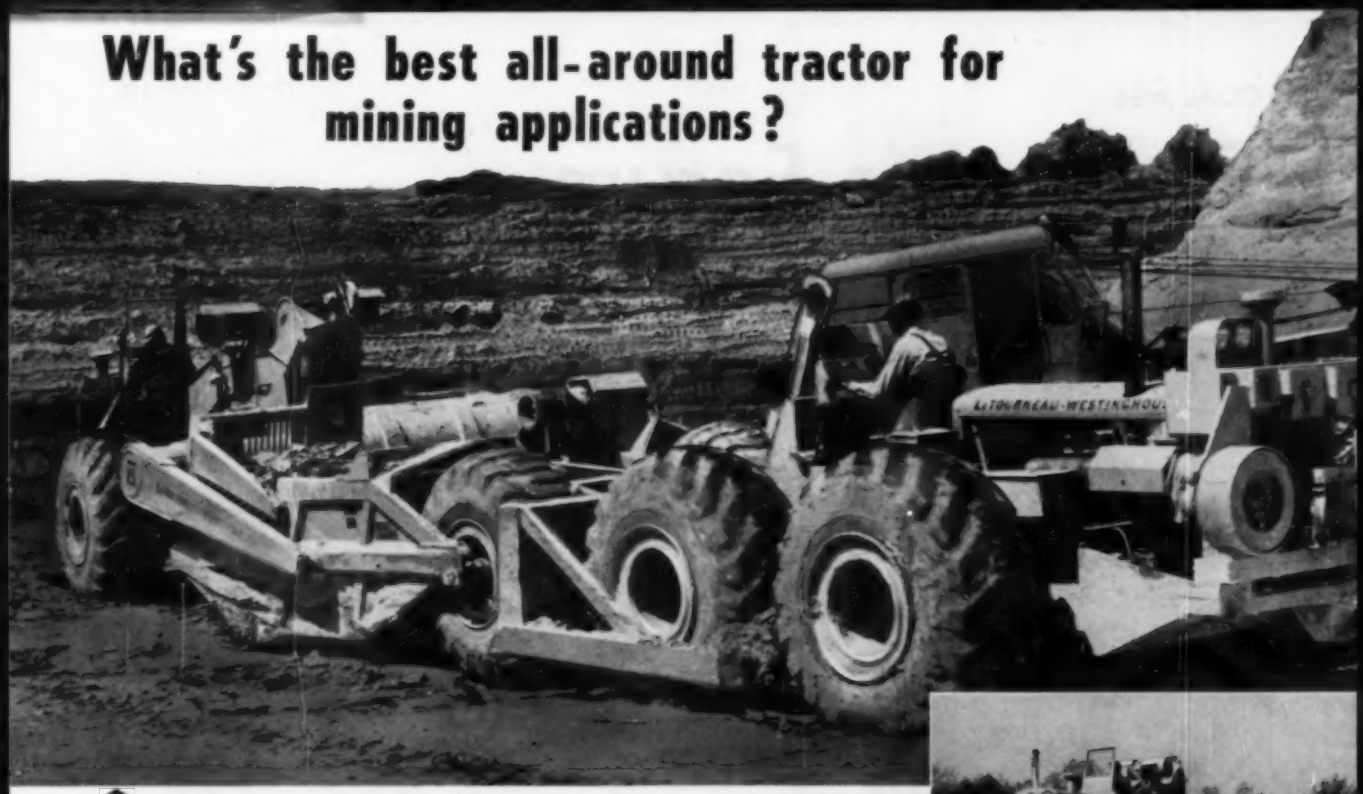
Trends: Today and Tomorrow—A full-scale roundup of developments in production, preparation and mining services, now in the works or soon to come.

Roof Control—The latest account of research into the possibilities of binding roof strata, using epoxy resins to "glue" the layers together.

Incentives for Foremen—An explanation of factors to be considered in designing incentive programs for coal's production supervisors.

In February, *Coal Age* will publish the first available review of the industry's record in 1957, complete with latest data on mining, stripping, preparation, safety, marketing of product and equipment purchases.

What's the best all-around tractor for mining applications?



"Tournatractor can push-load two scrapers in the same time a crawler pushes one," says Supt. Jim Vaughn, of B & B Construction Co. Stripping overburden for M & M Clays, Inc.'s kaolin pit, rubber-tired tractors helped C Tournapulls load in just 48 seconds.

Wide, low-pressure tires gave good traction and flotation in wide variety of materials encountered on project. Other Tournapull features that helped speed production included 29.9 mph travel speed, exceptional maneuverability, instant-acting electric power system.

Ask A. S. Boone — whose B & B Construction Co. does a lot of contract stripping, mining, and hauling for clay operations in the "kaolin country" around Irwinton, Georgia. He'll give you strong arguments in favor of rubber-tired LeTourneau-Westinghouse Tournatractor®.

High crawler upkeep prompted switch to Tournatractor

B & B once used only crawler tractors. But when the firm's books showed that repair bills on 5 crawlers in 1 year totaled $30,000, Boone recalls, "It was time to look for tractors that would operate in sand, clay and water without high repair costs."

Two Model D Tournapull® scrapers B & B owned had cost only $450 in repairs for over 5000 hours of work. Because Boone and his men figured rock-bottom maintenance costs should run "in the family", they bought 2 new Tournatractors. Here's what's happened:

DOWNTIME: Tournatractor downtime has been only 10 days, compared to 30 per year *per crawler.*

LUBE TIME: B & B's work records show Tournatractor can be lubed in 5 minutes . . . far less than a crawler.

REPAIR COST: When the firm bought its 2 Tournatractors, it also purchased 4 C Tournapulls and a new crawler. *The maintenance cost of all 6 L-W machines has been approximately $4500, that of the one crawler approximately $2200.*

"Does work of 2 or 3 crawlers"

Has replacing 4 crawlers with only 2 rubber-tired tractors affected production? "Yes," says Boone, *"we get a lot more done!* Tournatractor does the work of 2 or 3 crawlers." For a sample of the kind of production B & B's getting nowadays, check the accompanying work report.

Tip: Why not take a close look at *your* crawler maintenance costs . . . then look at Tournatractor. Ask us for full details.

B & B's rubber-tired fleet strips 8,000 yds. a day

One of B & B's recent contracts involved stripping overburden at M & M Clays, Inc.'s kaolin pit at McIntyre, Ga. From top surface to kaolin, the 36' deep overburden included layers of clay-and-sand, pure sand, water-and-sand, and — just above the kaolin — a 3' layer of sticky gumbo. L-W Tournapulls, with Tournatractors pushing, kept production steady throughout the wide range of materials . . . clicked off 2290' cycles in an average of just 3.9 minutes.

C Tournapulls, with 18-yd. Fullpak* scrapers, pushed by husky Tournatractors, loaded in a hurry. Average load time was only 48 seconds; distance was 90'; and payloads averaged 11 to 12 yards of the heavy materials. When B & B used its full fleet of 4 C 'Pulls* and 2 Tournatractors, daily production averaged a big 8,000 cu. yds.

*Trademark CTCP-1573-MQJ-1

LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

Foremen's Forum

Get Off the Worry-Go-Round

Dr. Henry B. Rollins, medical director of Connecticut Mutual Life Insurance Co., sent us these examples of how men can crack themselves up through self-induced tensions. Look long and hard. Are you among this group? If so, relax a little.

The Wheels Go 'Round

A real "wheel" in action. If he doesn't calm down, he'll explode one of these days.

Of course you'll see few men with four phones on their desks. We exaggerated this one a bit to emphasize how foolish this man is. Pretty soon he'll be where he can't phone any more.

If you doubt that this way of living is disastrous, just read obituary notices for a few days. You'll be shocked to learn how many young men die from sudden heart attacks. Doesn't make much sense, does it?

Have I Got What It Takes

Every businessman will recognize this fellow. All his working life he has fought to get to the top. Now his big moment has come. Suddenly panic grips him.

Hi Tension is beginning to bore in, create anxieties and undermine his self-confidence. If our friend doesn't understand it's only natural to have a few momentary qualms, he's in for trouble. A mature man knows he can master his fears

CONGRATULATIONS, BILL! YOU'RE OUR NEW VICE-PRESIDENT. PLENTY OF RESPONSIBILITY BUT YOU CAN HANDLE IT...
"HE'S AFRAID OF RESPONSIBILITY. AFRAID OF SUCCESS... I'LL HAVE HIM JUMPING OUT OF HIS SKIN AFTER A WEEK ON THE JOB.
HI TENSION

by facing them. When opportunities come, he accepts them gladly, takes his responsibilities in his stride.

If this man hadn't shown plenty of ability during his career, he wouldn't have been chosen for an important job. So what's he worrying about?

SURE! WE CAN DO IT FINE! WE'LL GET THEM OUT FOR YOU IN A COUPLE OF DAYS!
HI TENSION
"THAT WILL FIX IT FOR ME! HE'S BEEN PILING WORK ON WORK UNFINISHED BUSINESS ON MORE BUSINESS... WON'T BE LONG NOW..."

Yes Man!

Good old Joe! He can't say "no". There's one in every office. Everybody takes advantage of him. Then suddenly Joe has a heart attack. He's away from the office for three or four months. Yet, the business goes on.

If there is a Joe in your office, show him this example of how Hi Tension can slowly build up such pressure that something has to give. If it hurts Joe's feelings to realize that no one is indispensable, he'll get over it. But he may never get over the damage he inflicts on himself by taking on more than he can handle.

Joe must learn to say "no". He can't take on everything.

(*Continued on p 94*)

When choosing your shovel feeder cable...

How much of a choice do you really have?

HIGH RESISTANCE TO MOISTURE is just one of the benefits you get with Rome's portable shovel cable. This tough cable—available with *both* oil-base and butyl-base insulations—provides long-life service under the most severe conditions.

Shovel cable may *look* alike . . . but you can find as many differences in cable as you can in mining operations. And your particular kind of operation deserves the one best cable.

That's why it's so important to choose your Type SH-D cable from a manufacturer who can offer you an unbiased recommendation as to the proper insulation for your own application.

Your choice of insulations. Rome Cable is one of only three major companies now making *both* butyl-base and oil-base insulations. This means you can describe your mining conditions to a Rome representative and get the one *right* insulation for your feeder cable. No matter what you want most in your cable—maximum resistance to heat, moisture, or ozone resistance—you can be sure of your choice when the cable is made by Rome Cable.

Tough jacket, too. Feeder cable takes a beating in most open pit mines, so you naturally want to choose a cable that's tough. Rome's mold-cured Rome 60 (neoprene) jacket provides maximum resistance to abrasion and crushing . . . and it's ideal for use in either wet or dry locations.

Choose carefully. No matter what type of shovel cable you need, take advantage of Rome's ability to offer you a *real* choice of insulations. When you present your shovel cable problems to your nearest Rome Cable representative, you can be sure he'll recommend the *right* cable—not just the best his company can provide. Contact him for more information—or write to Department 530, Rome Cable Corporation, Rome, New York.

ROME CABLE

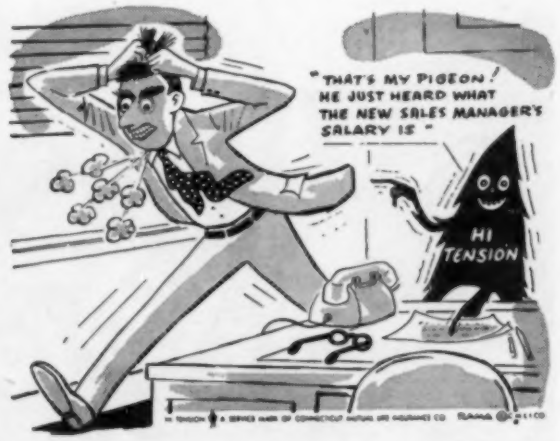
CORPORATION

Moonlight Madness

Recognize yourself? If you do, it's time to reorganize yourself.

Don't let unsolved problems of the day pursue you all night. As problems arise during the day, solve them. Make your decisions, then forget about them. Don't keep wrestling with problems that really aren't yours to solve. Most problems can be divided into two groups: those you can do something about and those over which you have no control.

And if you find yourself lying awake, don't fret about lack of sleep. Most of us don't need half as much sleep as we think. But we do need rest. So if you can't sleep, take it easy. You'll feel much better in the morning.



Envious Ed

Look at Ed! How can he do his job if he lets envy strangle him? Think of the nervous energy this man uses worrying about what someone else is getting paid. Envy never increased anyone's salary.

Ed ought to be honest with himself, try to face up to his own frustrations and do something about them. For only frustrated people are envious of others. Let Ed look to himself.

Put all you've got into your work. You'll get a kick out of working at the top of your ability. Your life is for yourself; make the best of it. You'll have something no one can take away from you.

Wishful Dreamer

Perhaps you think this dreary, passive looking guy wouldn't develop high tension. But you're wrong. It just doesn't show on the surface.

Frustration is one of Hi Tension's strongest allies. While his work piles up, this apathetic individual dreams about getting a more important job. He neglects his work, becomes bored with life and dreams about the big role he should be playing.

Our day-dreamer doesn't realize that many top executives in his own company once had jobs no more glamorous than his. He has never learned the satisfaction of doing his job as well as he can.

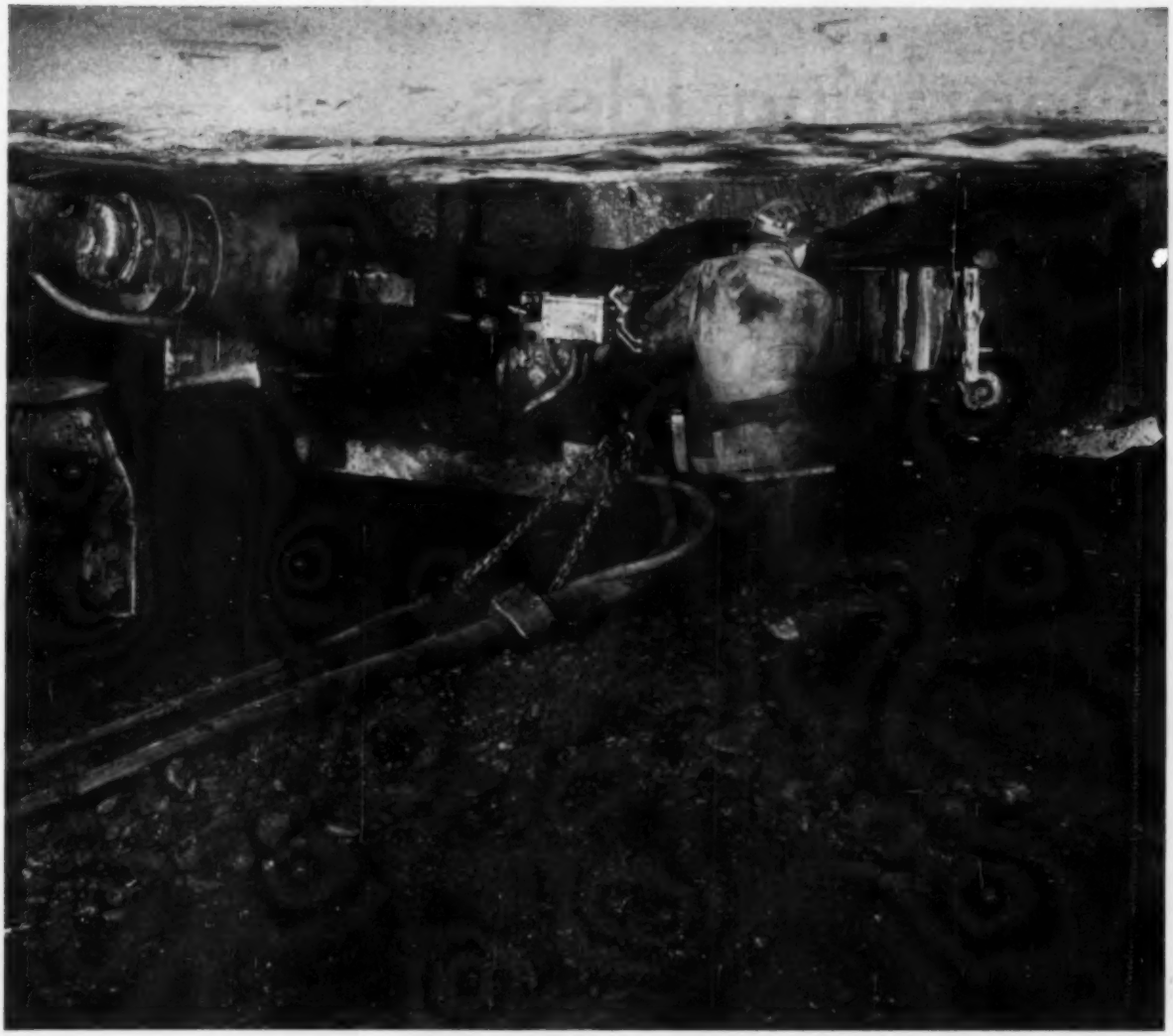
HI TENSION
"MOTHER FEELS NEGLECTED; DAUGHTER FEELS PUT UPON; SON FEELS MISUNDERSTOOD; FATHER IS FED UP—THEY CAN'T EVEN EAT DINNER. HAVE I GOT THIS FAMILY SEWN UP!"

The Family Next Door

Look at this family. They don't understand one another. They grumble, complain and criticize. They have a miserable time. Homes like this are breeding grounds for all kinds of emotional illnesses.

Don't take your troubles, your little peeves to the table. Try to understand each other's needs, as well as your own. Try to help one another.

The surest, easiest, most pleasant way to avoid indigestion is to relax while you eat. Have fun together. Laugh! Keep Hi Tension away from your table. Enjoy what you eat and eat what you enjoy.



How to reduce stop-and-go mining

Every time a machine is out because of cable failure, what choice do you have? Either you lose production or you must subject the other equipment used to handle the load of the disabled machine to excessive wear and tear.

But now you can minimize the downtime due to cable failure of continuous mining machines, cutting machines, conveyors and loaders. With Rome portable parallel duplex power cable, you're sure of longer working periods, even under the most grueling mine conditions. Here's why:

1. An open fibrous braid around each power conductor provides 360° of balanced adhesion to the Rome 60 (neoprene) sheath.
2. This braid also minimizes the individual movement of the conductors within the sheath when the cable is twisted or flexed.
3. The specially compounded Rome 60 (neoprene) sheath is highly resistant to acids, alkalis, oils, abrasion and flame.
4. For tire-like toughness that gives extra protection against mechanical damage, the Rome 60 sheath is vulcanized in a continuous lead mold.
5. Extra overload protection is provided by heat-resistant rubber compound insulation suitable for maximum continuous operation at 75C.

The next time you have to replace a portable mining machine cable, call your Rome Cable distributor. You'll be more than satisfied with the service Rome's cables will provide. Contact your nearest Rome Cable representative for more information—or write to Department 510, Rome Cable Corporation, Rome, New York.

ROME CABLE

CORPORATION

COAL AGE

Operating Ideas

Swinging Gate Replaces Overhead Barrier

A NEW swinging gate offers all the safety features of a conventional overhead gate plus the advantage of not having men walk under it as they enter or leave the cage. The new gate, which swings out instead of up, is in service at the manshaft of Harwick mine, Duquesne Light Co., Harwick, Pa.

To open the new gate, the top man raises it 6 to 7 in to free it from the dog. He then swings it open. A combination of a counterweight and rollers on the hanging brackets permits the door to be lifted with little effort.

As the gate is raised, a heavy nut secured to the counterweight rope with set screws, strikes an arm on a switch (arrow, right photo). This unit is interlocked with the hoist controls and when the nut hits the arm, power to the hoist is cut off. As long as the gate remains open the hoist cannot be operated. Note, however, the following:

If for any reason the cage must be moved while the gate is open, the hoist operator must throw a special emergency switch which energizes the hoist circuit. This must be done when Harwick's special supply car is being suspended from the bottom of the cage.

Pressure Chamber in Sump Starts Motor

HOW can a pump on intake air be started automatically from a device in a sump on return air? One answer to this question has been worked out by Frank Valla, assistant master mechanic, Harwick mine, Duquesne Light Co. He developed a control that operates on difference of air pressure created by the rise and fall of water level in an air chamber in the sump.

Here is how it works. As water rises in the sump, it compresses air in a chamber suspended in the water. A small-diameter pipe leads from the air chamber to a plunger in an oil-filled U-tube. The compressed air forces the plunger and oil down one side of the tube and up the other. As the oil rises it activates a pump starting switch in the pump motor control box.

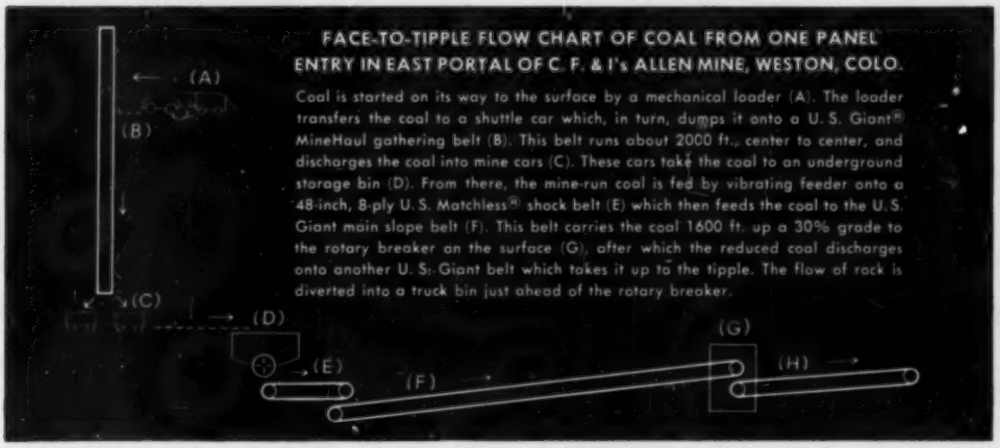
The air chamber in the sump is made from a section of 6-in pipe, one end of which is fitted with an airtight cover. A hole is drilled in the end cover and tapped for a small, ¼- to ¾-in, pipe. Care is taken to make all pipe joints air-tight between the air chamber and the U-tube at the pump.

There are five of these controls in service at Harwick mine and they have been used successfully since 1949. Mr. Valla says that there seems to be no relation between the size of the air chamber and the diameter of the pipe to the U-tube. In some instances the distance from the sump to the pump has been over 400 ft.

Two methods are used to stop the pumps. One system has upper and lower electrodes in the priming chamber. As soon as the water falls to the lower level the pump stops. The other system operates from the U-tube and relies on mercury switches to start and stop the pump. One tube serves as a starting unit and the other is a holding unit. When air pressure drops the tubes change position and break the circuit.

CONVEYOR BELTS

NO TRAFFIC JAMS ON THIS UNDERGROUND HIGHWAY SYSTEM



FACE-TO-TIPPLE FLOW CHART OF COAL FROM ONE PANEL ENTRY IN EAST PORTAL OF C. F. & I's ALLEN MINE, WESTON, COLO.

Coal is started on its way to the surface by a mechanical loader (A). The loader transfers the coal to a shuttle car which, in turn, dumps it onto a U. S. Giant® MineHaul gathering belt (B). This belt runs about 2000 ft., center to center, and discharges the coal into mine cars (C). These cars take the coal to an underground storage bin (D). From there, the mine-run coal is fed by vibrating feeder onto a 48-inch, 8-ply U. S. Matchless® shock belt (E) which then feeds the coal to the U. S. Giant main slope belt (F). This belt carries the coal 1600 ft. up a 30% grade to the rotary breaker on the surface (G), after which the reduced coal discharges onto another U. S. Giant belt which takes it up to the tipple. The flow of rock is diverted into a truck bin just ahead of the rotary breaker.

30-inch, 4-ply, style XN, U. S. Giant Mine-Haul gathering belt receiving mine-run coal from shuttle car. Note use of U. S. Royalite® Skirtboard rubber to facilitate loading.

48-inch, 8-ply, U. S. Matchless Ustex®-Nylon main slope conveyor belt. It has already carried millions of tons of mine-run coal. Note the extreme conditions of cold and moisture.

This 320-ft. c-c belt is a 48-inch, 5-ply U. S. Giant. It carries minus one and one-half inch broken coal up a 9% grade from the rotary breaker to the railroad loading tipple.

The Allen Mine of The Colorado Fuel and Iron Corporation is one of the safest and most modern coal mines in the West. It is another fine example of engineering skills combining with U. S. Rubber belting to produce a maximum in efficient operation.

The mine was opened about five years ago and U. S. Rubber Conveyor Belts have been used almost exclusively in just about every phase of the face-to-tipple operation.

There has never been a belt failure and Mine Superintendent L. W. Ingles has expressed complete satisfaction with the belts.

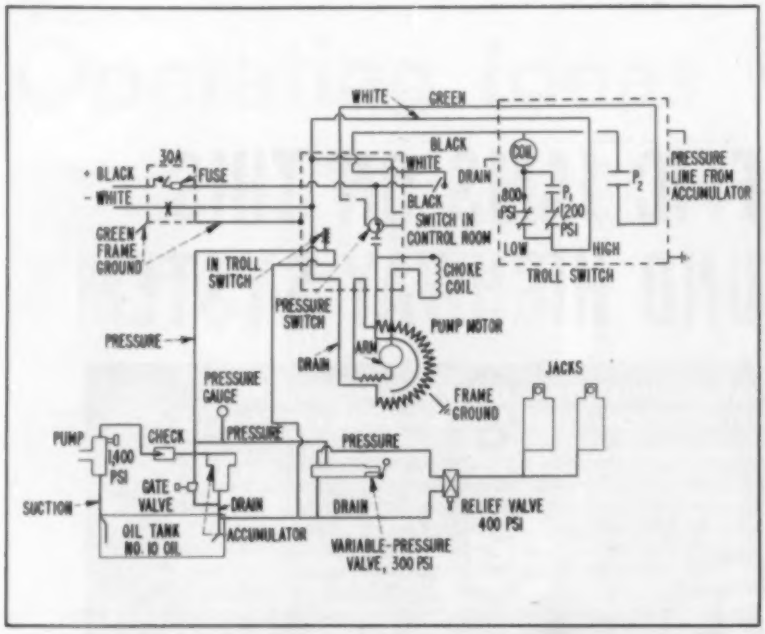
For greater output at lower cost per ton, ask for U. S. Rubber's Three-Way Engineering. This service, plus a complete line of conveyor belting for any mining requirement, is available at the 28 "U. S." District Sales Offices or by writing us at Rockefeller Center, New York 20, N. Y.

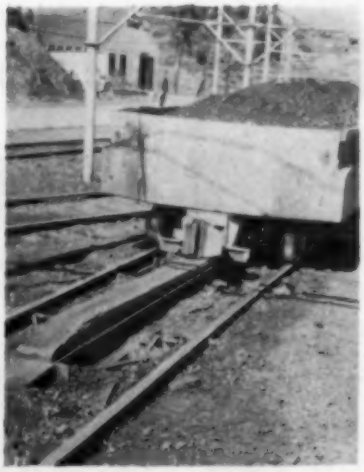
In Canada, Dominion Rubber Co., Ltd.

Mechanical Goods Division

United States Rubber

See things you never saw before. Visit U. S. Rubber's new Exhibit Hall, Rockefeller Center, N.Y.





HYDRAULIC CAR RETARDER made in Duquesne Light Co.'s Warwick shop eliminated trouble at car dump caused by loaded cars overriding chain haul. Unit was made from components used at the mine. Details of the retarder are shown in the sketch.

Hydraulic Retarder Smooths Car Feed

SMOOTH FEEDING of cars to the rotary dump and elimination of trouble at the car haul results from application of a hydraulic car retarder at the Duquesne Light Co.'s Warwick mine. Loaded mine cars waiting to be dumped now are held back on a slight down grade until a car is dumped and the chain haul is started to pull another loaded car into the dump.

Before the retarder was developed, loaded cars sometimes overrode the chain haul. As a result, the dogs on the haul did not come up at the end of the car. Instead they came up under the car and caused the car to derail or damaged the car haul itself.

To try to prevent this trouble, the company tried safety blocks and skids. But these were time consuming and generally unsatisfactory. Then the idea for the hydraulic retarder was born. Shortly thereafter it was made in the mine shop from various components of equipment used at the mine.

The retarding action is provided by a 5x7¾-in by 12-ft hardwood plank which is mounted in an 8-in channel. The channel in turn is fastened to two vertical single-acting hydraulic jacks from the scroll head of a Joy 4JCM continuous miner. The hydraulic jacks push upward all the time a trip is fed through the dump. Boards last several weeks and can be replaced in a few minutes.

Other components of the unit include a 14-BU pump motor and pump with relief valve, L600 accumulator and variable-pressure valve, Troll switch from a Joy extensible belt. Details of the device are shown in the sketch.

When the dump operator arrives at the start of the shift he pushes a snap switch at his control station. This starts the motor powering the hydraulic system. Pressure builds up to 1,200 psi. The relief valve on the high-pressure side is set at 1,400 psi and the variable-pressure valve is set at 300 psi. A relief-pressure valve in the low-pressure line is set at 400 psi to take care of the difference in clearances of the mine cars.

When the oil is used to operate the system, pressure in the accumulator drops to 800 psi. The low-pressure side of the Troll switch starts the pump motor again and pressure again is built up to 1,200 psi. After the unit is started, everything is automatic.

Special Lubricant Boosts Gear Life

A NEW CONCEPT on the lubrication of enclosed gears, by fixed and dispersive lubrication and known as the Voler Reductol Plan, has been announced by Revol Ltd., according to *Colliery Guardian*, October 3, 1957. The company claims that by adopting their system, gearbox temperatures are reduced, high viscosity of the lubricant is maintained, both the life of the gears and the lubricant are extended, and the oil film strength is increased.

The method uses two types of media for separating the gear teeth: a greasy solid in suspension in a viscous fluid. The solid is a superfine colloidal graphite marketed under the brand name Voler "Drylube" A. and the liquid is Voler "Reductol", a high grade lubricating oil containing colloidal graphite in suspension and non-corrosive E. P. additives to counteract corrosion, together with a new silicone additive to reduce foaming.

In practice the plan is to use "Reductol" as the fluid lubricant and, before new gears are put in service, coat the teeth with the graphite compound. This nullifies the damaging effects of oil-film rupture which takes place when new gears are bedding down during the first 100 hr of running. A further advantage is that powdered metal which accumulates during the break-in period, is rendered less harmful because it is coated and mixed with displaced graphite and does not, therefore, float in the lubricating oil as a fine abrasive.

Either of the lubricants can be used alone, but only when used together are all of the benefits obtained. Curves plotted from test data indicate a sizable drop in operating temperatures on new gears of nearly 25 deg F by changing to the two lubricants. It was accompanied by a 50% improvement in the minimum working viscosity.

The lower operating temperatures are said to result from two things: (1) the fixed graphite on the teeth of the gears which reduced friction between gear teeth; and (2) by the additional lubricating film strength of graphite in dispersion in the lubricating oil.

TWO TO ONE.....

....you never made a quicker splice!

Now you can add or remove an entire section of cable in a minute!

Join same or different size cables from 4/0 to 1,000,000 cm by turning two cap screws!

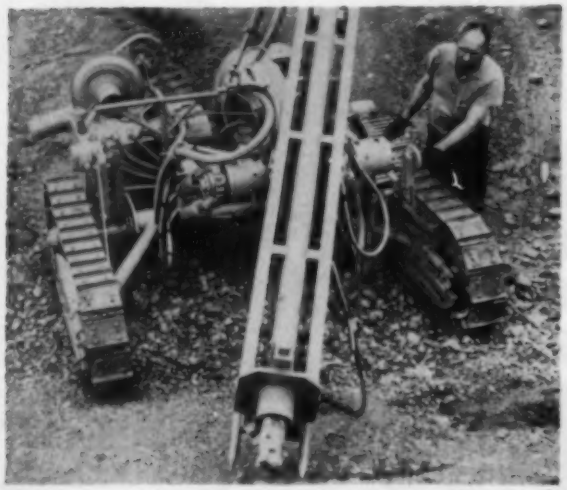
Extend feeder, tap off machine cables, make switch or panel connections with a speed and ease never before possible! When you leave the twin halves of these O-B "Cap Screw" Connectors permanently attached to your cable ends, you have a "built-in" connection ready and waiting wherever and whenever you need it. High strength, high current carrying capacity. Smooth, slim contours tape easily, drag over rough bottom without snagging. Write for more information today.

Ohio Brass

MANSFIELD OHIO, U.S.A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Equipment News



Inventive Drilling Machine

This new rock-drilling machine, which Reich Bros. Mfg. Co., Terre Haute, Ind., says handles jobs in quarries or mines with unusual ease, combines both rotary and hammering actions. The drill, rotating at 60 rpm, is also activated up and down by compressed air; the continuous shock load is handled by double-enveloping worm gearing. The manufacturer states that Model 150 can drill holes as high up as 7 ft or as close as 9 in to the ground. Horizontally, the unit can swing in an arc of 150 deg, handling the same range in a vertical arc. The machine is self-propelled on its own crawler tracks, both the tracks and the drill being driven by hydraulic power. A larger model, 250, is also available for larger diameter holes.

Steam Cleaner

Blasting dirt, mud, ice or other hard-sticking materials off field-equipment is facilitated by cleaner Model 250-HPC, which is mounted on a special trailer for easy movement. The unit, produced by Malsbary Mfg. Co., Oakland 3, Calif., contains two 150-gal water tanks, sufficient for 1½ to 1¾ hr of steam cleaning at 200 psi. The cleaner also has both a gas engine and an electric motor, so it can be plugged into normal electrical outlets or operated by gas engine in the field. Model 250-HPC gives operators a choice of hot solution to 300 psi for removal of stubborn materials, cold water to 300 psi for rapid removal of caked dirt, 200 F hot water to 300 psi for melting and removing ice and frozen mud, low-pressure wet steam for heating and thawing, or low-pressure warm water for washing equipment.

New Rock Hauler

Easton Car & Construction Co., Easton, Pa., restyled their standard off-highway drop-door side-dump trailer, so that it would meet state highway regulations while still hauling maximum payload. To allow maximum loads without exceeding rules for load distribution, safety and overall dimensions, the company's engineers used special alloy steels and a tadem trailer suspension. Lights, directional signals and splash guards meet regulations, according to the firm. The trailer's body has a fully automatic door; dumping is accomplished by means of a standard push-button automatic electric overhead system.

Rugged, Flexible Hose

Thermoid Co., Trenton, N. J., has announced the marketing of a new wire braid hose designed for severe service in industrial operations. Named "Thunderbird," the hose is said to be

Gets the best of BAD SEAMS...

CP Hydraulic Coal Drill

Drilling a 9 foot hole every 30 seconds in bad seams is standard for this 35 lb. coal drill. Long auger lengths are easy to handle. Its high torque motor packs the power for hard drilling . . . responds instantly. 1000 RPM auger speed holds vibration to a minimum.

Run the CP-35-HCD from the power system of cutting, timbering or roof bolting machines. Absolutely safe . . . no sparks or shock . . . no kick on stall! For details, write: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

ACCESSORIES INCLUDE: **Valves, gauges, junction blocks, hoses and fittings**

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

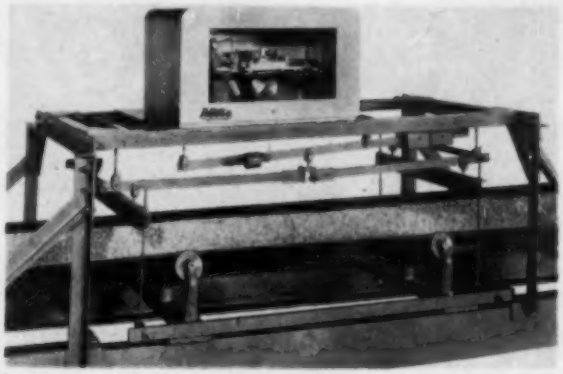
ideal for hard, out-of-door uses such as quarry, mining and construction work. Working pressures up to 400 psi air and 2,000 psi water are specified for the flexible thermoid hose. The firm reports that the hose features a heavy gauge, neoprene tube, compounded to resist hot or cold oil without flaking or swelling. Its carcass incorporates high-tensile steel wire braid to withstand high working pressures as well as external blows and impacts; the angle of the braid is controlled to maintain flexibility and prevent expansion or elongation. The firm goes on to say that "Thunderbird" will defy jagged rocks and rough terrain, and that it is light grey for better visibility.

Giant Washing Machine

Link-Belt Co., Chicago 1, Ill., designed this model of its king-size washing machine, showing how coal is cleaned by the new Link-Belt dual-bed air-pulsated wash box. New design features include individually controlled dual washing beds, complete automation of refuse discharge and fewer moving parts. The machine uses air to pulsate water for separating coal and middlings from refuse. The increased width of the combined washing beds permits high capacities, and individual control of each bed is designed to insure precise separation. The company states that one man can control, by pushbuttons, the entire operation of a coal preparation plant, using this equipment.

Utility Tractor

International Harvester Co., Chicago 1, Ill., has announced a new tractor, the 330 Utility, increasing its wheel tractor line to 11 basic models. Delivering an estimated 35 hp at the belt, the new tractor is heavier than others in its power class, providing the strength and stability needed for fast, tough utility work, according to the company. The machine is said to have built-in strength and power capacity for handling heavy-duty backhoes, hoisting 4,000-lb loads with a fork lift, or lifting 1,250-lb loads with a front-mounted loader.



Belt Conveyor Scale

For weighing, controlling, and totalizing free-flowing bulk materials, a redesigned line of belt conveyor scales is available from ABC's Scale Div., McDowell Co., Inc., Cleveland. The scale housing is fabricated from dust-sealed aluminum, with neoprene sponge seals, compared with the former housing, which was of steel, with felt seals. A full-opening door with three-quarter size window improves visibility, permits easy access for setting, routine checking and maintenance. Utilizing mechanical linkages in both weight measuring and registering systems to minimize and simplify maintenance, the belt scales are built to an accuracy of ½ to 1% of flow over their entire range, according to the manufacturer. The base of the scale has been changed to rigid, jig-welded steel, instead of the former casting.

Metallurgy Discovery

Caterpillar Tractor Co., Peoria, Ill., is pleased with results of experiments in the use of boron to create harder, more durable steel. Recently, they announced use of the element to increase life of crawler-tractor sprockets. Named "Boralloy," these sprockets are now standard equipment on Caterpillar D8 and D9 tractors. The company says that success of the experiment, done in cooperation with Harrison Steel Castings

BIG CAR STRENGTH IN THESE GOODMAN

SHUTTLE CARS FOR LOW COAL··· AC or DC

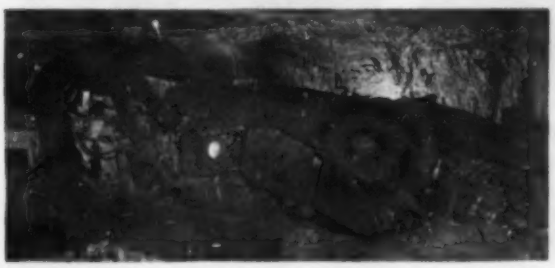
These cars have all the structural strength expected only in big shuttle cars. Wheel units, gear reducers, electrical control parts, conveyor chain and flights are counterparts of those found in the big, rugged Goodman cars—some are even interchangeable. The frame of the cars, including side plates, is a welded, one-piece unit reinforced with heavy cross members. The conveyor pan is made of ⅜" steel plate on the 26" car, ½" on the 32" car. Conveyor chains are extra strong and are made to accommodate pull-out type flights. Reversible chain drive is available.

The two traction motors on each car, and the conveyor and hydraulic pump motor are 10 hp. All have high continuous rating and all use identical and interchangeable motor shells and armatures. Loaded running speed is 4 mph.

Water level full capacity of the 26" car with 45° discharge end extension is 90 cu. ft.; of the 32" car it is 114 cu. ft. Capacity of the 32" car can be increased to 175 cu. ft. with the addition of 8" sideboards. The cable reel is hydraulically controlled for winding and unwinding from bottom position.

Standard Goodman features, of course, include 4-wheel power steering, 4-wheel disc type brakes, 4-wheel positive drive, dual control in operator's cab, adjustable height discharge, U.S. Bureau of Mines approval.

A Goodman pair to complement Goodman low vein shuttle cars—the Type 2400 for fast cutting, the Type 965 or 966 loader for high capacity loading. For AC or DC operation.



GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

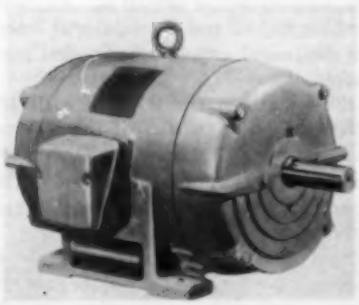
Co., was the first commercial attempt to produce the boron-bearing cast carbon steel by the acid open hearth process. Boron, the firm declares, is acclaimed a worker of miracles, for which manufacturers are finding many uses despite the fact that boron chemistry is still in its infancy. It is reported that brand new concepts will be opening up in the fields of automotive fuels, jet and rocket fuels, plastics, nuclear-handling and control equipment, etc. Boron is not newly known. It was used by ancient Syrians in forging their famous "Damascus" swords. In steelmaking, minute amounts are added to improve depth of hardness resulting from heat treatment, an ability recognized for many years. Whether boron treated steel will bite deep into the market for conventional steels will be revealed in the future.

Pickup Truck & Cab

The "Travelette," an International Harvester Co. pickup truck with a 6-passenger cab, has just been introduced by the Motor Truck Div. of the organization. It is designed to meet many industrial, commercial and family transportation requirements, where either a conventional truck or a passenger car may be inadequate. It is available either with 6-ft pickup body or 82½-in service-utility body, and will handle up to full ton loads, according to its designers. It is also offered in 4-wheel-drive. For further information write to 180 N. Michigan Ave., Chicago 1, Ill.

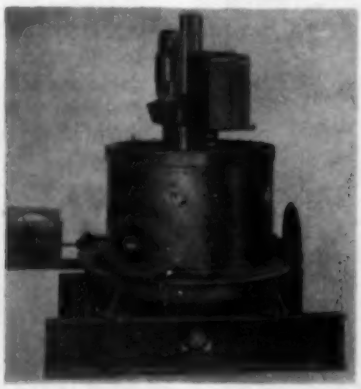
New I-T-E Circuit Breakers

Complete re-design of its low-voltage power circuit breakers and of the switchgear that makes use of them has been announced by the Switchgear Div., I-T-E Circuit Breaker Co., Philadelphia, Pa. The company states that the result is a sweeping advance in terms of performance, simplification and complete standardization. The new switchgear, which is considerably smaller than previous systems designed by the firm, features a closed-door draw-out for low-voltage power circuit breakers. Breakers can be moved from operating to test and disconnect positions within their enclosure without opening switchgear cabinet doors. A second major advance cited is the quick-make manual closure—a feature which, it is declared, can prolong the life of contacts and even of the breaker itself, by eliminating damaging arcing that results from slow, careless closure by hand. A motor driven stored-energy system for electrically-actuated models stores energy for closure, thus cutting drain on the breaker's secondary circuit from as much as 160 down to 10 amp.



Induction Motor

Louis Allis Co., Milwaukee 1, Wis., has designed and constructed what is considered to be the first synchronous induction motor built in the same NEMA frame size as a standard motor of equal horsepower. The "Syncro-Spede," touted to be unusually compact, is also said to be ideal for precision timing and metering devices because it is unaffected by voltage fluctuations. The motor runs at exact synchronous speed without permanent magnets or dc excitation involving collector rings and brushes, wound rotating fields, etc. It is manufactured in ratings from 1 to 100 hp in any enclosure type and can be foot- or flange-mounted.



Automatic Thickener

In answer to the mill operator's need, Denver Equipment Co., Denver 17, Col., has developed a high-capacity thickener with completely automatic raising and lowering thickening mechanism. The unit allows the operator to take advantage of improved flocculating agents for increased rates of settling. The firm feels that the constant attention that must be given most thickeners for high capacity service is a cost factor which is eliminated with their new automatic unit.

Railweight Method

International Railroads' Weighing Corp., Chicago, Ill., has turned out a

NEW! THE CAT* NO. 7G BULLDOZER

Blade tilts 3' to either side!

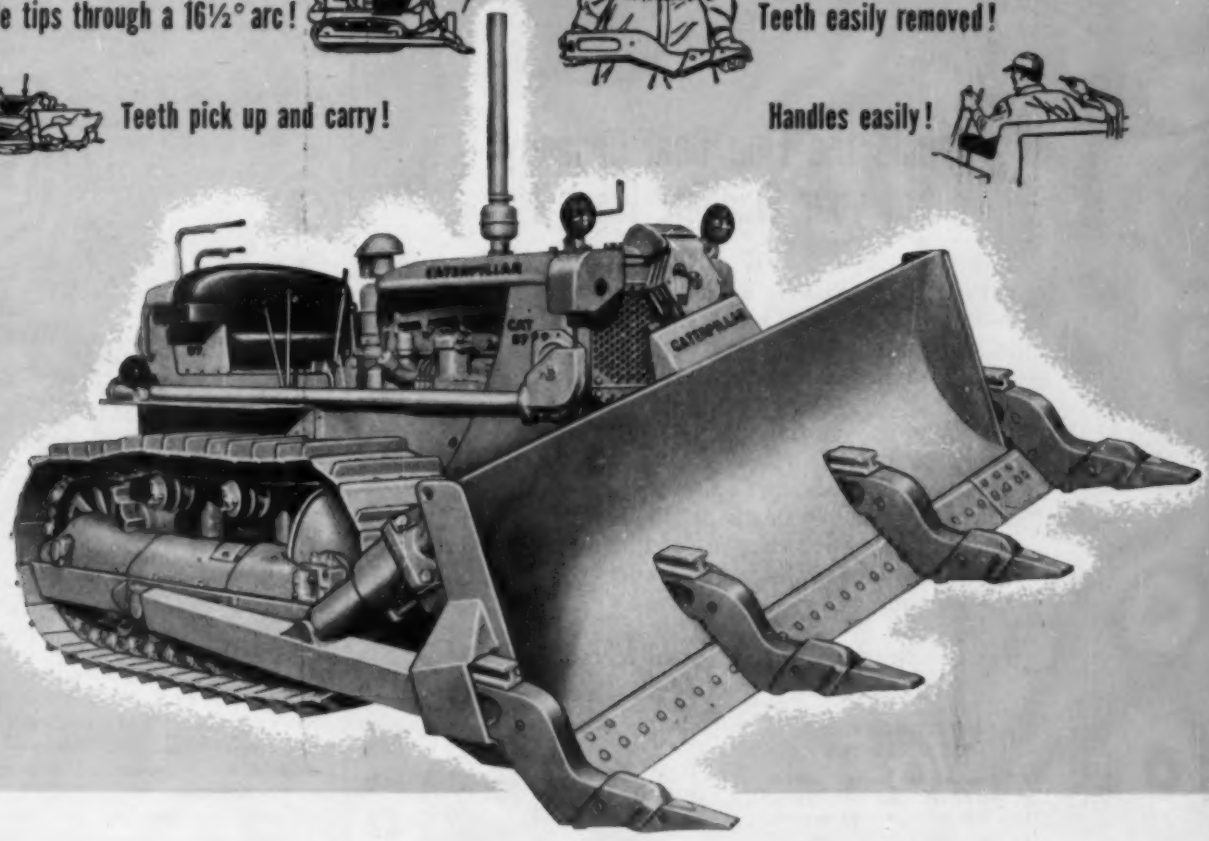
Blade tips through a 16½° arc!

Teeth pick up and carry!

Teeth slice through hard materials!

Teeth easily removed!

Handles easily!



'DOZER AND RIPPER IN ONE

The brand-new Caterpillar No. 7G Bulldozer is a completely different type of bulldozer. The amazing tilt-tip action, and its four heat-treated cast steel teeth, are an entirely new concept in 'dozing. The Gyrodozer is both a 'dozer and a ripper.

YOU'LL GET HIGHER PRODUCTION

The Gyrodozer rips through hard or frozen materials. Its 23" teeth not only pry out boulders but pick 'em up and carry 'em away. In rocky soil, the wedging action of the teeth surfaces small rocks for scooping up by the 10' 10" blade. On the really tough jobs, the tractor's full horsepower can be put behind a single tooth. The Gyrodozer is ideal for uprooting trees and clearing an area in a hurry.

EASY TO OPERATE

A Cat No. 25 Cable Control raises and lowers the 'dozer and a front-mounted No. 44 double-valve Hydraulic Control tips and tilts the blade. The operator never needs to leave his seat to make a blade adjustment.

GET FULL DETAILS

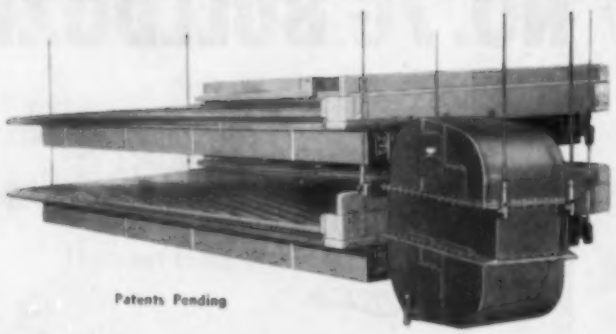
on the revolutionary new Gyrodozer from your Caterpillar Dealer.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WANTED—
THE HARD WORK



Patents Pending

Double the Fine Coal Capacity of your Washing Plant

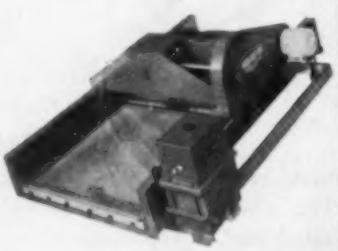
The CONCENCO® 77 Diagonal-Deck® Table with its twin washing decks now makes it possible to get twice as much washed coal per day as you have been getting from the same floor area with single deck tables.

Not only can you thus postpone the erection of a new plant when you wish to expand, but you can save on construction costs when you do build, because the decks of the 77 table are in floating suspension that (a) eliminates the need for heavy foundations and (b) reduces impact to the building.

For complete information, send for Bulletin 77.

ECONOMY FOR SCREENING

All New Model Leahy® screens utilize proven differential vibration that snaps oversize wedging particles loose 1600 times per minute. When dust is a problem, tota'ly enclosed models are available. For damp screening, Flex-Elex® electric heating of the screen jacket insures full-time open mesh. For wet screening CONCENCO spray nozzle arrangements are available.

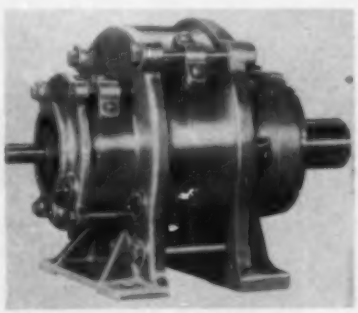


THE DEISTER ★
CONCENTRATOR
COMPANY
923 Glasgow Ave. • Fort Wayne, Ind., U.S.A.
CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company • Inc. 1906*

Equipment News (*Continued*)

new weighing system which will allow coupled-in-motion freight car weighing. The corporation's directors say that the system will save American railroads as much as $500,000,000 million annually. The mechanism weighs cars individually while the whole train runs over the scale. The key to the system is a set of specially designed rails at the approach to a standard scale which eliminates the bind between car couplers. Heretofore, weighing cars while coupled and in motion has been impossible because of the transfer of weight between cars through the bound couplers which made one car weigh heavy while the other weighed light.



Speed Reducers

Crichton Co., Johnstown, Pa., announced a speed reducer idea, which is incorporated with the already extremely flexible gear speed reducer line. The new machine, a small gear reducer, may be attached to a much larger one, consequently the large unit has more than ample capacity to carry heavy output shock loads, the firm declares; whereas, the input reducer is designed for the high-speed to perfectly balance the overall design. The company goes on to say that savings in cost and weight are as high as 30%, as compared with other speed reducers.

Versatile Loader

The front-end loader, working at a strip mining operation, is attached to a tractor and moves up to one cu yd of coal at one pass. On a two-shift basis—about 17 hr—the unit, manufactured by

COAL MINING

DIESEL LUBRICATION GUIDE

CITIES SERVICE

WHAT CAUSES LUBRICATION FAILURES?

The biggest single reason for lubrication failure is improper selection and application of lubricants.

Today's lubricating oils are made for highly specialized purposes. The fact that an oil seems ideal for the requirements of one piece of equipment is no guarantee of its qualifications for other machinery.

For example, choice of an oil with low detergency may result in stuck rings, excess cylinder wear, injector clogging, bearing wear and other diesel difficulties.

Next time you're considering what type of oil to use for a certain piece of equipment, call in a Cities Service Lubrication Engineer. He not only has the precise oil for the particular unit you want to lubricate, but may be able to simplify your entire lubrication picture and reduce maintenance costs as well.

USERS ACCLAIM CITIES SERVICE C-300 OIL

From a strip miner comes this report: "Shovel and dragline work 20 hrs. a day, seven days a week. Each have rolled up over 14,000 hrs. with no major overhaul, using Cities Service C-300 Motor Oil."

From a leading stone company: "Our six stationary diesels, powering our compressors and crushers, have averaged 12,000 hours each before major overhaul, with Cities Service C-300 Oil."

From a trucking company: "Our 20 diesels get up to 225,000 miles before overhaul with Cities Service C-300 Oil. We don't even grind the valves before then."

With excellent oxidation resistance, high detergency, and low carbon residue, Cities Service C-300 Oil may be the perfect lubricant for your machinery, too.

Get the facts from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

USING A SULPHUROUS FUEL? TRY THIS NEW CITIES SERVICE OIL

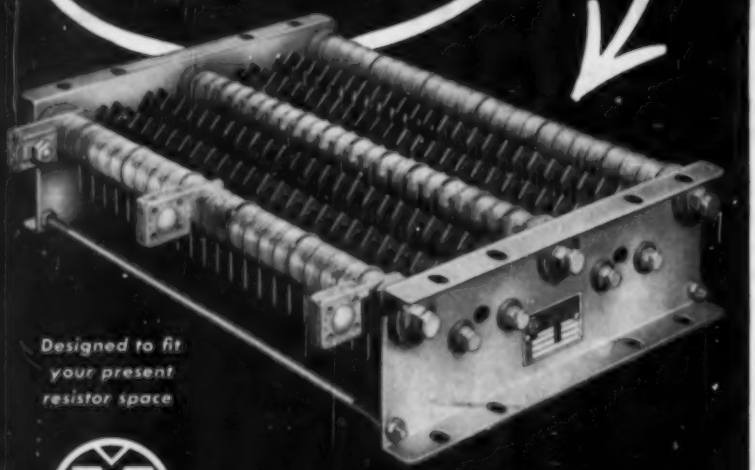
If you're using a diesel fuel with high sulphur content, your motor oil must do more than its normal share of work to fight engine deposits.

Cities Service C-100 Motor Oil has been formulated for just this purpose. Under dusty, dirty, and sulphurous conditions, it provides excellent engine lubrication and protection. Talk with your Cities Service Lubrication Engineer for details.

MAN YOU SHOULD KNOW

Barney Fleming is the Regional Manager of Industrial Oil Sales at the Cities Service office in St. Paul, Minnesota. With a background of 35 years as a lubrication engineer and a talent for solving problems, he is typical of the Cities Service engineering staff that's at your service. A call to the nearest Cities Service office will bring a member of this staff to your plant or job site.

RUGGED
all the way thru!



Designed to fit your present resistor space

P-G STEEL GRID RESISTORS
consistently prove their value in
MINING SERVICE

- Steel Construction
- Mica Insulation
- Corrosion Resistant
- Vibration Proof
- Moisture Resistant
- Provision for Expansion
- Adequate Ventilation
- Rugged Terminals

By use of those durable raw materials . . . steel and mica, and the P-G exclusive features of design, these steel grid resistors have the "built-in quality" to overcome factors which often cause resistor failures. Vibration, moisture laden or corrosive atmospheres have little effect on continuity of service. Try Post-Glover Resistors for heavy duty applications where resistors are subject to severe service . . . continuous "Trouble-Free" performance is assured.

P-G
The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY
OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky
MAILING ADDRESS—Box 709, Covington, Kentucky

Equipment News (*Continued*)

Sherman Products, Inc., Royal Oak, Mich., handles 20 carloads or about 900 cu yd of coal a day, according to the firm. The machine, with its ¾ cu yd bucket capacity, is reported to give twice the capacity and production per man hr than was possible with previous loaders which could be used only for bucket loading. The Sherman front-end loader is useful in coal pushing, heavy shovel work, gravel loading and miscellaneous heavy lifting around mining sites.

Truck-Mounted Compressor

A new "Auto-air" rotary compressor is now available from Davey Compressor Co., Kent, Ohio. The unit, Model 125RA, is truck-mounted and driven direct from the truck engine through a heavy-duty power take-off. The latter eliminates need for a separate driving engine; "Auto-Air" can be mounted directly on the truck chassis or on a platform base and is adaptable to any type of truck body, according to the manufacturer. The compressor is of the Davey multi-stage rotary type with a single free-floating rotor and is reputed to have less than one-half as many working parts as other rotary units of the same capacity. The entire outfit weighs 915 lb.

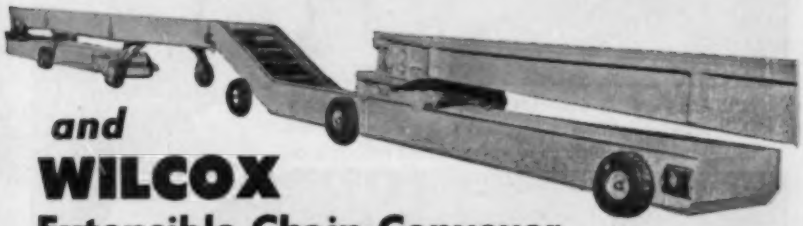
Plastic Zippertubing

Zippertubing Co., Los Angeles, Cal., has produced a sheathing for electrical circuits, which is catching on in a variety

IT'S HERE! TRUE CONTINUOUS MINING FOR LOW SEAMS

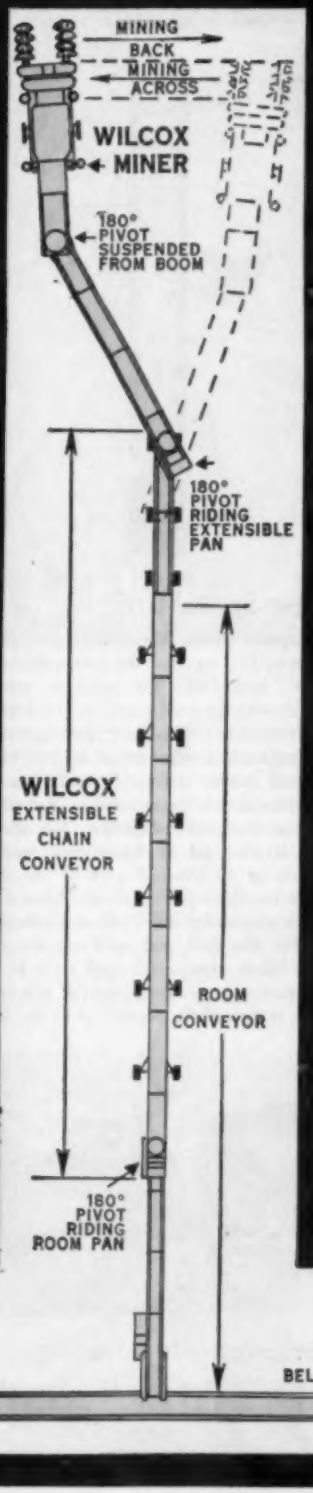
with the

New WILCOX MINER



and

WILCOX
Extensible Chain Conveyor



OR NOW adaptable to SHUTTLE CAR continuous operation with the WILCOX SURGE CAR

The Wilcox Continuous Miner is producing coal in various mines from Alabama to Nova Scotia. Working since early 1955 in various seams 28″ to 46″ thick with such satisfactory results that 95% of the customers have repeated orders for from 1 to as many as 12 miners to a customer.

THE WILCOX CONTINUOUS MINER

- ★ IS the lowest continuous miner on the market today in height, cost, and maintenance
- ★ IS producing up to 250 tons per shift with only 3 men at the face.
- ★ IS satisfactorily producing coal under roof conditions where other mechanical equipment has failed.

THE WILCOX EXTENSIBLE CHAIN CONVEYOR is the missing link to true continuous mining. Tried, tested, and proven to have many successful features such as

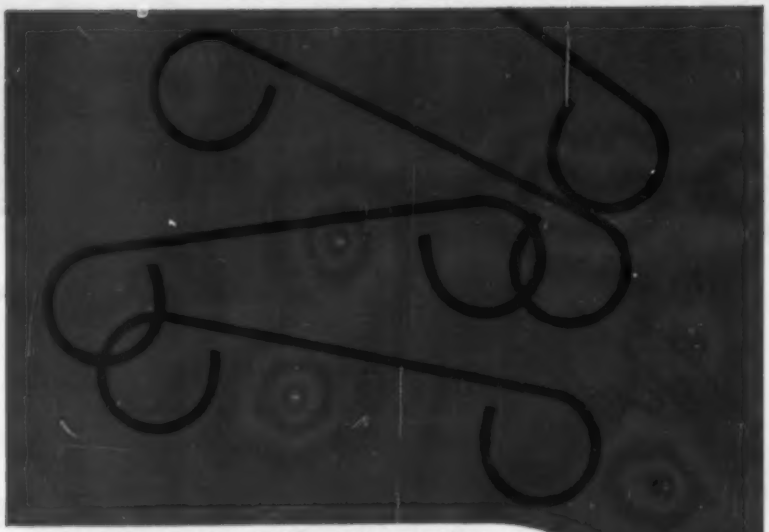
- ★ No down time for panning up during a shift
- ★ Assures a continuous flow of coal from face to outside without spillage
- ★ Assures more working hours per shift
- ★ And higher continuous tonnages

RESULTS: MORE TONS PER MAN—LESS COST PER TON

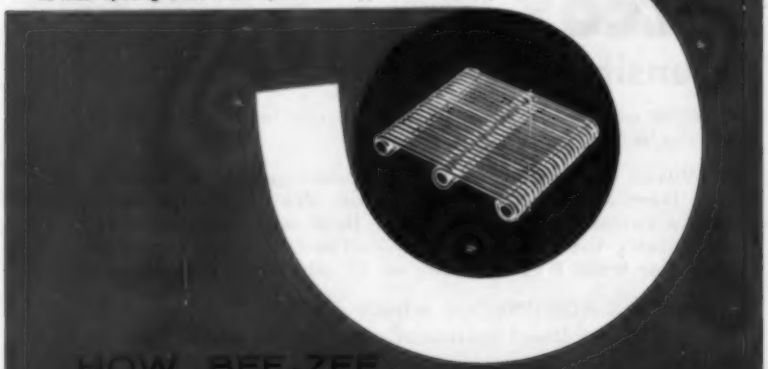
For additional information call CLifford 2-5373, Beckley, W. Va., or write

WILCOX
MANUFACTURING COMPANY

P. O. BOX 217 • RALEIGH, WEST VIRGINIA



NEW BEE-ZEE BH LOOP SCREEN is non-rigid to prevent clogging. Short, individual screening rods are looped – not welded – around tie-rods. Spacing is controlled by washers slipped between loops.



HOW BEE-ZEE KNOCKED CLOGGING FOR A LOOP

To give mine operators a solution to extreme clogging problems, Bee-Zee engineers produced a new type of screen operating on entirely new principles. Bee-Zee's BH Loop Screen is made up of "loose" segments that multiply the action of a vibrator. Clogging is prevented without distorting accuracy.

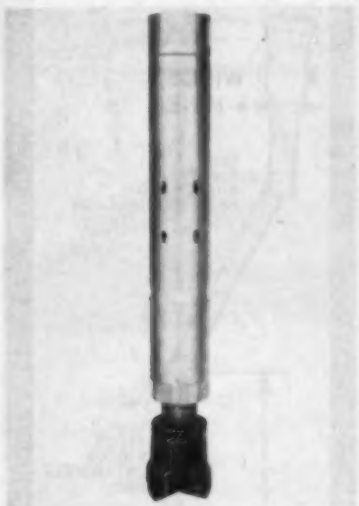
Whether your own screening problems are highly unusual or "run-of-the-mine", Bee-Zee Screens can provide the answers–and make you money. Screening rods can be round, triangular or specially shaped. Electronically controlled welding fuses them to tie rods to form screens in all shapes, sizes and dimensions. Type or make of screening equipment is never a problem.

Write, wire or phone Galesburg 4397. Ask for a specific recommendation or one of the complete Bee-Zee catalogs – or both.

BIXBY-ZIMMER ENGINEERING COMPANY
1127 Abingdon Street, Galesburg, Illinois

Equipment News (*Continued*)

of industries, including mining, according to the firm. Groups of wires, tubes, pipes and hoses can be protected by Zippertubing from abrasion, corrosion, bad environmental conditions or excessive wear; the zipper pull-tab, used to close the tubing, may be "unzipped" and re-used or permanently sealed.



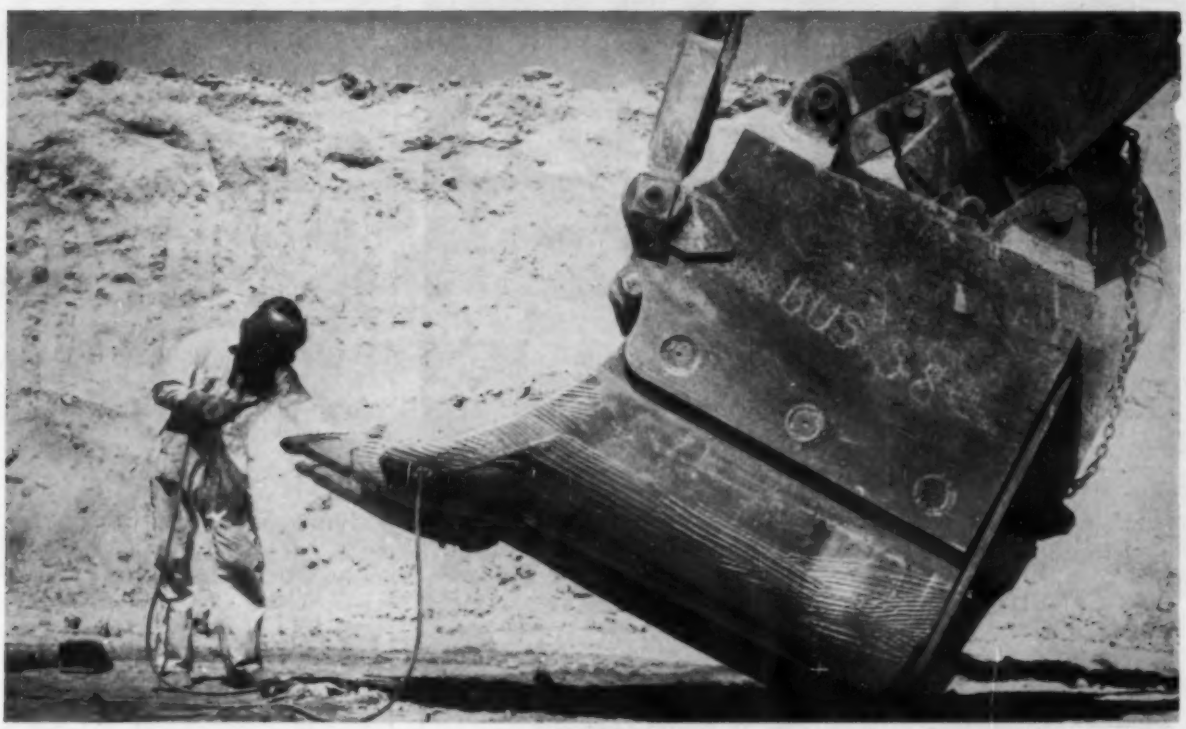
New Speed-Drill

Reports from Gardner-Denver Co., Quincy, Ill., say that the new percussion type "Mole-Dril" for open-pit mining works with unusual speed in the hardest of formations. This increased speed, it is declared, is the result of very high ft-lb of energy delivered directly to the bit, plus the drill's unusual hole-cleaning ability. In hard formations, the special tool is attached to the tappet, thereby becoming an integral part of the drill. As a result, it is explained, "Mole-Dril" gives maximum efficiency regardless of depth; the drill rod between the drill and bit is eliminated, and with it, the inherent energy dissipation of the ordinary surface drill, according to the firm.

Grooved Steel Tubing

Republic Steel Corp., Cleveland 8, Ohio, announced that mill-grooved light-wall electric resistance welded steel tubing for use in mechanically coupled

How STOODY HARD-FACING *keeps* STRIP MINING EQUIPMENT *on-the-GO!*

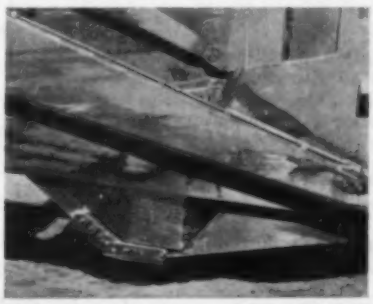


A few beads of Stoody Electric Tube Borium *keep the points of these shovel teeth out to size, while unprotected teeth lose a full inch of length in the same time.*

Heavy earth moving equipment used in open pit operations lasts far longer and requires fewer replacement parts when wearing surfaces are hard-faced with Stoody alloys. The illustrations show typical examples of both manual and semi-automatic applications. For top welding speed—2 to 4 times faster than manual welding—use Stoody semi-automatic tubular alloy wires... to speed maintenance during short down periods and between shifts, to save time and cut over-all costs.

Ask your Stoody dealer for a free copy of the Stoody Guidebook and the Semi-Automatic Wire folder; this literature covers hard-facing recommendations for all types of heavy equipment. Check the "Yellow Pages" of your phone book for local distributors—or write direct.

Shovel teeth *are first hard-faced as shown with Stoody 100 by the semi-automatic welder. Points are touched up manually during lunch time and at end of shift with 5/16" Stoody Coated Electric Tube Borium.*



Cutters and sides of scrapers *are subject to severe wear. Semi-automatic application of Stoody 100 provides protection.*

STOODY COMPANY
11943 East Slauson Avenue
Whittier, California

Parallel beads *of Stoody 100 are run along bed of dump trucks to reduce wear in these areas. Material packs between beads, further reducing wear.*

Ripper teeth *have wearing surfaces hard-faced semi-automatically with Stoody 100. 1 or 2 beads of Tube Borium hold points to size.*

American Coal Crushers are

RUGGED!

Soundly engineered and constructed to give you many years of high volume crushing at low operating costs.

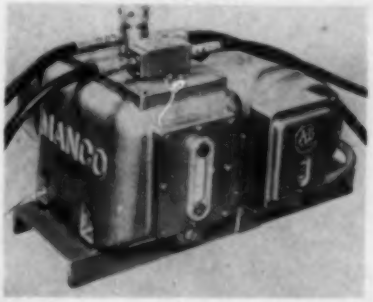
1. Oversize bearings.
2. Alloy Steel heat treated rotor shaft.
3. Heavy rib reinforced housing with renewable liners and tramp metal pocket.
4. Manganese Steel crushing elements.
5. Exclusive American-Originated rolling shedder ring which splits coal instead of crushing it.
6. More efficient crushing design which permits slower operating speeds and less power consumption per ton of coal crushed.
7. Dual adjustment to give flexibility of size control and to compensate for wear.
8. Maximum flexibility of rolling ring rotor prevents injury from tramp iron.
9. Full width screening area gives faster discharge of reduced product.

Coal Crushers exclusively, from Sample Crushers to Capacities of 800 TPH
Write for literature stating capacity you need.

American PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1119 MACKLIND SAINT LOUIS 10, MISSOURI

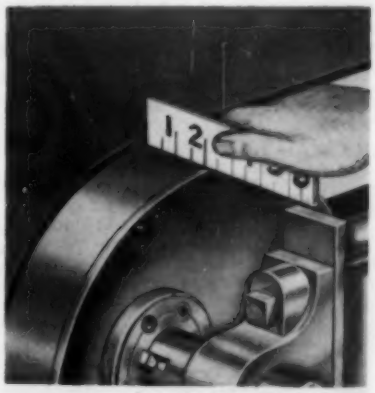
Equipment News *(Continued)*

piping systems is now in production. Since the groove forming operation does not require removal of metal from the tubing wall, the latter is ideally suited for application with relatively high-pressure mechanical couplings, according to the firm. The quick assembly coupling alleviates the necessity for adding any fixtures for holding coupling devices.



Hydraulic Power Unit

Manco Mfg. Co., Bradley, Ill., has announced a new hydraulic power and pump package-unit with model designation, HA-1, for operating high pressure hydraulic equipment. Among the features of this new unit is its adaptability to varying requirements in the range from 4.1 gal per min at 5000 lb per square in to 3 gpm delivery at 8,800 psi. An externally located valve makes possible quick adjustment of pressure in the field; according to the manufacturer, the specially designed belt-driven, six-piston pump unit provides exceptionally quiet and smooth fluid delivery.



Wider-Face Pulleys

The "Marco" tubular frame conveyors, made by E. F. Marsh Engineering Co., St. Louis 10, Mo., have new features, which, the company says, provide greater protection against belt-edge damage, thereby increasing belt life. With what is claimed the widest frame in industry, these conveyors have 100%

THE BOSS SAYS:

"My DW21s move more dirt cheaper, faster, longer than any machine in its class"

The boss—Superintendent Charles Lowe of the C. P. Fugate Company—uses his two CAT* DW21 Tractors with No. 470 Scrapers to remove 40 to 50 ft. of overburden from a 36-in. seam. Mr. Lowe relies on a 100% Caterpillar spread of high production on this strip mining job one mile east of Wise, Virginia.

A Caterpillar D9 Tractor with No. 9S Bulldozer push-loads and handles the dirt spread by the DW21s, and a D8 cleans up around the shovel and levels out. The DW21s move up to 3500 cu. yd. of dirt per 10-hr. day—a credit to the speed and stamina of this rugged Cat two-wheel Tractor plus the LOWBOWL design of the No. 470 Scraper.

On handling ease of the DW21s, Superintendent Lowe quotes his operators: "We find them easy to operate—no tricks necessary—and they are 100% when it comes to maneuvering in tight squeezes."

The extra-long life, proven durability and handling ease of rugged Caterpillar equipment are the reasons why contractors and operators prefer it when high production counts. For details, get in touch with your Caterpillar Dealer—the same man you contact for replacement parts you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar, Cat and Tractaculer are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

how much has the conveyor carried to NOW?

The MERRICK WEIGHTOMETER gives the answer. While material is smoothly moving along a conveyor, the MERRICK WEIGHTOMETER not only keeps a continuous and accurate record of weights but total weight is available at a glance.

Applied to any size belt conveyor, either horizontal or inclined. The Weightometer gives a simplified and dependable record of your production, without interrupting flow of coal.

Write for Bulletin 851

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic Weighing Equipment
PASSAIC, N. J.

Equipment News (*Continued*)

more space in the critical area between the belt-edge and the nearest frame member during the return run, permitting a minimum possibility of belt damage, should the belt wander, according to the firm.

Portable Oxygen Mask

The Fyr-Fyter Co., Dayton, Ohio, has introduced a portable air-oxygen mask and resuscitator combination unit, providing equal protection to rescuer and asphyxiation victim. Known as "Dual:fe" and weighing 39 lb, the unit contains 32 cu ft of gas in its two chromaloy cylinders, enough for about 40 min of use as a combination or about an hour's service individually.

Mechanical Oiler

Applying a film of oil to chains, gears, slides or irregular surfaces is accomplished automatically by a machine, recently put on the market by Trico Fuse Mfg. Co., Milwaukee 12, Wis. Needle valves on the dispenser, which can be mounted in any convenient position, meter just the right amount of oil to applicators; these applicators, the manufacturer reports, are not ordinary bristle brushes, but are specially designed to resist temperatures up to 275 deg F. without spreading or distorting. Trico chain oilers have clear pyrex glass reservoirs or shatterproof lucite cylinders so that the oil supply is always visible.

Guyan HEATERS

FOR CONFINED AREAS

ALSO AVAILABLE IN FLOOR TYPE

WALL TYPE

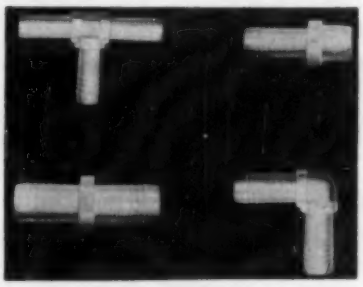
RUGGED and ECONOMICAL TOO!

WHEN the space is hard to heat — such as a crane or locomotive cab, a pump house or small office — a GUYAN natural convection heater is the answer. It is a DEPENDABLE, LONG-LIFE HEATER consisting of corrosion-resistant aluminum chromium wire — wound on ceramic forms — and mounted within expanded steel housings.

GUYAN Heater Units are ruggedly built to stand the hard service that is customary in tough industrial applications. Available from 1,500 thru 7,500 watts for 110, 220, 440 volts DC or AC. Priced right — more economically than you might think — and lower than you can make your own. Write for complete information.

GUYAN MACHINERY CO.
LOGAN, WEST VIRGINIA

Guyan HEATERS



Nylon Pipe Fittings

Precision-made Dur-X nylon fittings for use with plastic pipe have been developed by Franklin Plastics, Inc., Franklin, Pa. Made of nylon resin, these fittings will not corrode or rust, according to the company. During manufacturing they are subjected to special tough-

How to select the right Link-Belt chain for specific coal service conditions

FILE HARD PROMAL makes this C-131 chain conveyor especially resistant to abrasive wear. Application is a tank-type heavy media vessel.

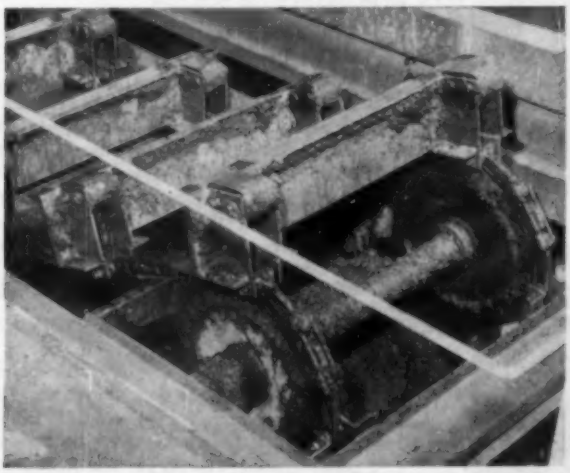
Use Class C chain for economy on drag conveyors, elevators

Here's a popular, durable, low-cost chain for elevator and conveyor applications. Because of its relatively broad top and bottom surfaces, it is particularly resistant to sliding wear, common to drag conveyor operation.

C Class chain combines two types of link construction into an economical chain assembly. Center links consist of simple, rigid and rugged castings . . . sidebars are made from selected steel . . . steel connecting pins are locked in the sidebars and only rotate in each end of the center link where generous bearing area is provided.

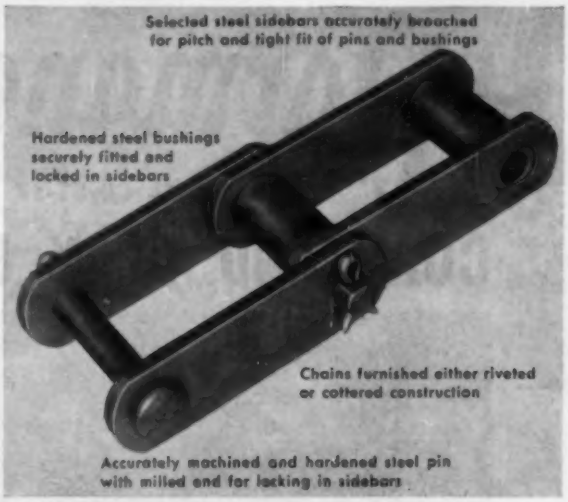
When conditions demand, Link-Belt manufacturing and application knowledge will produce a chain specifically tailored for your service. For example, center links are available in Promal and file hard Promal as well as malleable iron. Specially treated joints and special hardening in localized areas give greater wear-resistance. A wide variety of attachments is offered.

Lightweight rivetless chain is ideal for flight conveyors



FLIGHT CONVEYOR in coal preparation plant is a typical application of Link-Belt rivetless chain. It is ideally suited to this service, being high in strength and resistance to shock loads.

Although it has the light weight desired for long flight conveyors, Link-Belt rivetless chain offers the high strength at relatively low cost, needed to meet sudden impacts and heavy overloads. Open joint construction makes it ideal for operating in materials that have a tendency to pack. Simplicity of chain design permits dismantling by hand . . . lengths can be altered without tools.


Selected steel sidebars accurately broached for pitch and tight fit of pins and bushings
Hardened steel bushings securely fitted and locked in sidebars
Chains furnished either riveted or cottered construction
Accurately machined and hardened steel pin with milled end for locking in sidebars

LINK-BELT SS BUSHED CHAIN is especially engineered to resist chain joint wear under gritty or abrasive service.

SS bushed chain has extra-hard joint surfaces for abrasive jobs

Link-Belt SS bushed chain resists the abrasive wear encountered in coal handling operations. Hardened joint surfaces—up to five times harder than standard malleable, resist the cutting action of abrasive particles.

Sidebars of selected bar steel are accurately formed and machined for tight press fit of pins and bushings. These straight steel sidebars with hardened steel pins and bushings provide strength to prevent distortion under continuous heavy loads.

Many sizes of these heavy-duty chains are interchangeable with Link-Belt "C" Class. A wide range of attachments makes them adaptable to specific coal service requirements.

HEADQUARTERS for chains, sprockets and other Link-Belt conveying and mechanical power transmission products is your nearby Link-Belt factory branch store or authorized stock-carrying distributor.

LINK-BELT

CHAINS AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,723

ening processes which enable them to withstand impacts as high as 75 lb, it is reported. Other characteristics of the fittings include deep standard IPS threads and a hexagon hub which is designed to provide a gripping surface for ordinary wrenches.

Equipment Shorts

COATING PROCESS—A new process of protecting elevator buckets with a smooth, durable coating of vinyl has been developed by Bauer Bros. Co., Springfield, Ohio. Because materials will not adhere to vinyl, which is also rust proof and abrasive resistant, maintenance of buckets will be reduced and bucket-life will be increased, reports the company.

FULL-FLOW FITTINGS—A complete line of full-flow fittings and three styles of quick couplings—for use in the recently announced "Vic-Easy" method of jointing lightweight, rolled-groove pipe and tubing—are available from Victaulic Co. of America, Elizabeth, N. J. The line includes full-flow elbows, tees, reducers, etc., of every style, for use with light-weight steel or aluminum pipe with rolled-groove ends.

LONGEST CONVEYOR BELT—What is considered to be the longest conveyor belt in the world recently left the plant of the Manhattan Rubber Div. of Raybestos-Manhattan, Inc., Passaic, N. J. The belt measured 2940 ft long or more than one-half mi. The belt, wound on a reel just under 13 ft in diameter, was reportedly headed for a prominent coal mine.

NEW SPEED AND DRILLING ECONOMY
WITH THE NEW IMPROVED

Parmanco

MODEL CD-51-57

COAL AND CLAY DRILL

• Augers Rotated by Vickers 21.5 H.P. Fluid Motor with Hydraulic Feed Finger Tip Controlled
• Cutting Shield And Guide Completely Automatic
• Drill Powered By 65 H.P. Water Cooled Motor.

Jack Foehrer, Pit Foreman says
"THE PARIS DRILL IS THE BEST WE HAVE EVER USED."
SEND FOR COMPLETE DETAILS

PARIS MANUFACTURING CO. PARIS, ILLINOIS

NEW BATTERY—A new 4-cell, 6-v super-powerful torch, said to be the first on the consumer market, features a special battery designed by Burgess Battery Co., Freeport, Ill. The unusual 4-cell battery allows a beam of light with intensity far greater than standard 2-cell batteries, but does so without the bulk and weight of larger lanterns which would provide comparable light, according to the company.

CONTROL OILER—A new automatic line oiler which shuts-off the air supply immediately when the oil is used-up has been placed on the market by Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. It has 1-pint capacity, sufficient for a full shift of operations.

QUICK UNLOADING—To speed unloading of bottom-dump mine cars, Syntron Co., Homer City, Pa., announced their new "Fluid-Power" car rappers with magnetic holders. Operated on oil pressure from a closed circuit pumping system, the rappers deliver 300 sharp, powerful jolts per minute. The firm remarks that the units, used in pairs, are easily installed in tipple or car dump—suspended by cables positioned so that the magnetic holding devices clear the trip.

BLADE TILTING—A new hydraulic cylinder attachment for tilting No. 7S bulldozers controlled by No. 25 cable controls has been announced by Caterpillar Tractor, Peoria, Ill. The hydraulic cylinder replaces the bulldozers blade's left tilt brace and provides in-the-east blade tilting, eliminating the need for the operator to dismount in order to shift the blade.

DUST FILTER—W. W. Sly Mfg. Co., Cleveland, Ohio, says that its new "Roll-Clean" dust filter retains the advantages of the original filter while providing a more efficient method of cleaning collected dust from the filter bags. The new roller cleaner moves

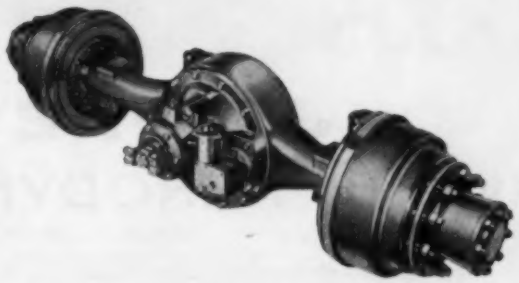
IN EATON 2-SPEED AXLES

REDUCES STRESS AND WEAR

ADDS TO AXLE LIFE • CUTS MAINTENANCE

KEEPS TRUCKS ON THE JOB • LOWERS OPERATING COST

Eaton's exclusive planetary construction distributes gear-tooth loads over four "planet" gears, holding stress and wear on any one gear tooth to a minimum. Completely locked out in the high speed range, these four gears rotate only slowly in the low speed range. The result is quiet operation, easy clash-free shifting, minimum wear, materially longer axle life. This rugged planetary design, plus forced-flow lubrication enables Eaton 2-Speeds to establish outstanding performance records. Eaton 2-Speeds also reduce stress and wear on engines and all power transmitting parts; they make it possible for trucks to haul more, quicker, longer, at lower cost.



More than Two Million
Eaton Axles in Trucks Today.
For complete information,
see your truck dealer.

EATON *AXLE DIVISION*
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Engine Valves •Tappets •Hydraulic Valve Lifters •Valve Seat Inserts •Jet Engine Parts •Hydraulic Pumps Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning Fastening Devices •Cold Drawn Steel •Stampings •Gears •Leaf and Coil Springs •Dynamatic Drives, Brakes, Dynamometers

Equipment News (*Continued*)

back and forth across the open ends of the filter bags, sealing each bag as it is being cleaned by atmospheric air. Features stressed are: more cloth area; easier filter-bag changing; and complete dust sealing.

AIR MAKE-UP UNIT—A new air make-up unit is now being offered to industry by the Aerovent Fan Co., Inc., Piqua, Ohio. Designed to temper outside air and supply it in sufficient quantities to eliminate negative pressures, this new unit supplements the normal heating system by relieving the infiltration heat load. The unit replaces exhausted air with clean, fresh, pre-heated air.

ASH AND SULFUR TEST—A new high-temperature method for determining ash and sulfur in coal and coke is now being introduced by Laboratory Equipment Corp., St. Joseph, Mich. Employing a Leco high-temperature furnace and a new Leco automatic sulfur titrator, the new system obtains extremely rapid analysis of sulfur in coal and coke—approximately 6 min as opposed to 1-6 hr required by former procedures, it is reported. Coal is burned at a temperature in excess of 3000 deg F in a stream of oxygen. Sulfur is released as SO_2, and is titrated automatically with the sulfur titrator.

JEFFREY

type 6F AERODYNE® fans

For light and medium-duty mine ventilation up to 5" W.G. pressure, Jeffrey offers this new fan. It combines low cost with high efficiency, and includes the fine engineering features of all Aerodyne fans, first introduced by Jeffrey in 1936.

Proper coursing of air through a mine, or in an industrial plant, is a problem that can be answered only by experience and scientific knowledge. Jeffrey ventilating engineers can draw upon forty-six years of such experience to assist you in selecting the type and size of fans and blowers best suited to your requirements.

Catalog 901 describing this equipment will be sent upon request to The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

Free Bulletins

FLEXIBLE COUPLINGS—Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill., has released book No. 2775, containing 12 pages of data for couplings with maximum bores, ranging up to 7 in and ratings from 2½ to 572 hp per 100 rpm.

HYSTER BACKHOE—A 16-p brochure, offered by Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore., explains characteristics and design of backhoe, No. D-4. It provides data on features, which, the company feels, makes the machine the most powerful mobile hydraulic excavating machine in its class. The backhoe, it is declared, will chew up dirt down to 13 ft below grade.

SAFETY FILM—"Make Mine Safety" is the title of a new 16mm sound-color motion picture just released by Colorado Fuel & Iron Corp. It is available for free loan to mines, schools, colleges and all groups interested in the mining industry. Write Thos. J. Barbre Productions, 2130 S. Bellaire St., Denver 22, Col.

TWO-WAY RADIO—General Electric Co., Communication Products Dept., Syracuse, N. Y., offers a 16-p pamphlet on two-way radio for business, industry, public safety, etc. The pamphlet, No. ECR-479, describes radio communication as vital where rapid transportation of information is a must. It discusses licensing, engineerng and dependabilty.

CONVEYOR PULLEYS—Descriptive information is offered in a new catalog, No. CP-57, on strengthened heavy-duty conveyor pulleys, manufactured by American Pulley Co., Philadelphia 29, Pa. The company states that design changes have brought the pulleys completely up to date in the belt manufacturing trade.

SLING CHAINS—A short dissertation of the properties and capabilities of ACCO registered sling chains is contained in a 4-p bulletin, DH-101, which has been made available by American Chain Div., American Chain & Cable Co., Inc., York, Pa. Featured is a listing of the seven main points to consider when ordering sling chains. A chart gives working load limits of 2-leg chains of X-Weld 125

colder weather? hotter prospects!

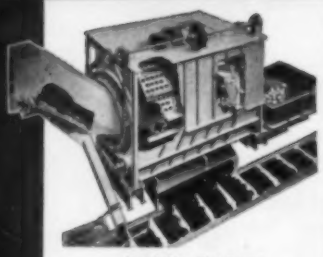
Ashland Permatreat Coal Spray Oil — *Lasts the life of the coal!*

- **FREEZE PROOF**—Permatreated coal resists freezing and eliminates frozen car pockets.
- **DUST PROOF—ODORLESS**—Permatreated coal insures dustless deliveries and handling, odorless storage and burning.
- **DECREASE WATER ABSORPTION**—Permatreated coal repels water.
- **REDUCE MOISTURE**—Less moisture, less freezing, higher BTU's.
- **AVOID CORROSION** — Non-corrosive Permatreat can't pit or corrode stoker equipment, or rolling stock.
- **MAINTAIN QUALITY** — Permatreat reduces deterioration from weathering.
- **ELIMINATE WINDAGE LOSS**—that results in lost weight claims and air pollution complaints.
- **CONTROL BULK DENSITY**—Permatreat insures uniform coke production and quality.
- **SPECIAL ADVISORY SERVICE**—Available from nationally recognized authorities on coal treating.

ASHLAND OIL & REFINING COMPANY
Ashland, Kentucky

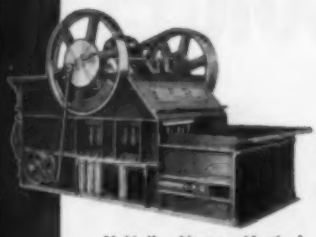
Ashland PERMATREAT

America's most complete line of CRUSHING EQUIPMENT



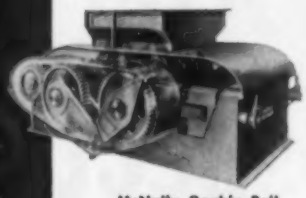
McNally Pittsburg Rotary Breaker

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



McNally Norton Vertical Pick Breaker

50% Less fines when reducing lump to egg and stove sizes.



McNally Double Roll Gearmatic ROM Breaker

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.

McNally Gearmatic Stoker Coal Crusher

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

McNally Single Roll Crusher

Universal application 20", 24" and 36" diameter rolls.

AVAILABLE

From Stock and on Short Delivery

For immediate action on complete information write, wire, or call.

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas Wellston, Ohio

Equipment News (*Continued*)

or Endweldur 125 chain, based on 50% proof tests.

HOLDBACK—Stephens-Adamson Mfg. Co., Ridgeway Ave., Aurora, Ill., has announced the availability of a new holdback bulletin. The brochure features comprehensive data, specifications and illustrations on the S-A standard roller type holdback, S-A totally enclosed type holdback and the S-A automatic ratchet and pawl. The booklet is designed to show S-A holdback advantages in protecting personnel and equipment.

MOTOR STARTERS—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., presented a bulletin with characteristics of the new, front-access, high-voltage starters for 2300- to 5000-v motors. Highlights played up are accessibility, protection and space economy. The starter is available, according to the firm, with oil-immersed contactor, where dust, dirt, moisture, and corrosion are problems.

ARMORITE—B. F. Goodrich Industrial Products Co., Akron, Ohio, released a booklet describing how Armorite is used as a liner, curtain, throw mat or pad for protection against abrasives. It is explained how Armorite outwears steel 10 to 1 in many such installations as chutes, hoppers and other wearing surfaces handling ore, sand or gravel; and flotation cells or dredge pump liners.

PAINT GUIDE—The first complete guide ever published for selecting and specifying latex emulsion and oil paints for any type of surface is available to architects, builders, contractors and engineers from Luminall Paints, Chicago, Ill. The 12-p "paintcyclopedia" features comprehensive specification charts for all interior surfaces, and two pages in the book are devoted to surface preparation.

TROJAN TRACTOR-SHOVEL—A brochure put out by Yale & Towne Mfg. Co., Contractors Machinery Div., Batavia, N. Y., discusses fast, economical, operation regarding the 1-cu yd capacity Model LHM-75 Trojan tractor; considered by the firm to be finest in its class, the machine features reverse curve safety arms for full 360 deg vision and independent bucket action permitting load carrying at arm level.

TRACTOR MAINTENANCE—Sight Feed Generator Co., W. Alexandria, Ohio, suggests its new 6-p booklet entitled, "Rebuild Worn Crawler Type Tractor Parts The Rexard Automatic Way." Different stages and conditions of wear patterns of tractor parts are illustrated together with a composite of tractor parts that can be rebuilt automatically such as rollers, flanges, idlers, rails, grouser bars and pads.

WELDING DATA—All the dope on simplified welding has been popped into booklet No. 2575A, available from Technical Information Service, Eutectic Welding Alloys Corp., Flushing 58, N. Y. It covers 120 welding rods, electrodes and welding compounds. Special welding applications such as joints with high electrical conductivity, resistance to chemicals, tinning and plating are covered. The publisher designed the booklet as a guide to help improve welding, brazing and soldering.

MINE VENTILATION—American Brattice Cloth Corp., 200 S. Buffalo St., Warsaw, Ind., released a 24-p leaflet describing production, construction and application of ABC flexible ventilation tubing. Typical metallic and non-metallic mine installations are shown, and one section illustrates various couplings, fittings and suspension devices for use with ABC tubing.

BELT CONVEYOR—The Goodman Mfg. Co., Chicago 9, Ill., producers of electric mining machinery, offers a new catalogue devoted to "Ropex," an extensible type belt conveyor which extends or retracts while running coal, under its own power. The 8-p brochure describes fully features of the conveyor unit, which links to any loader or continuous mining machine.

HARD FACING ALLOYS—The literature distribution section of Haynes Stellite Co., a division of Union Carbide Corp., 30-20 Thompson Ave., Long Island City 1, N. Y., presents a new

A 480-W dragline with a Bucyrus-Erie 14-cu. yd. bucket removes overburden at a coal mine in northwestern Kentucky.

Get the Most out of your Dragline... Use a HIGH-OUTPUT BUCYRUS ERIE BUCKET

Get the most out of your dragline by equipping it with a new Bucyrus-Erie bucket.

IT OUTPRODUCES — Full loads come easily. In digging, the weight of the bucket is concentrated to help the teeth, cutting edge and the thin "slicing-action" lip penetrate even the toughest materials quickly. The tapered basket fills full and fast. Dumping is fast and clean, helped by the smooth inside design of the basket and the extra-high arch.

IT OUTLASTS — Extra durability and high impact resistance are built into a Bucyrus-Erie bucket through the use of BECOLOY. This tough, fibrous alloy provides exceptional strength with light weight. It is readily welded and can be cut with acetylene torch — assuring low-cost field maintenance.

See your Bucyrus-Erie distributor. He will help you select the right size and type bucket for your job — light, medium or heavy, with solid or perforated basket.

24R57C

BUCYRUS-ERIE COMPANY • South Milwaukee, Wisconsin

Equipment News (*Continued*)

8-p booklet describing chemical composition, properties, typical applications, and procedures for 11 Haynes alloys, available as bare rods, crushed particles and powder.

GUARTEC IN MINING—General Mills, Inc., 400 2nd Ave. So., Minneapolis 1, Minn., offers new technical literature on the uses of "Guartec" in ore concentration, when utilized as an auxiliary reagent, settling agent or filtration aid. Benefits, basic application techniques and recommended procedures are outlined for various ore dressing tasks.

ELECTRONIC ANALYZER—Technical bulletin, No. 24, giving data on Aeroquip Corp.'s hydrauliscope, an electronic analyzer utilizing oscilloscopic principles, is available. The hydrauliscope is used chiefly to measure pressure activity and phenomena in the operation of hydraulic systems. Write Advertising Dept., Jackson, Mich.

BIT-GRINDING—Bay State Abrasive Products Co., Westboro, Mass., announces a new, 6-p booklet dealing with problems encountered in percussion and rotary rock-drill bit grinding. Questions covered are, how to grind and how to best select grinding wheels for rock-drill bits. Recommended specifications for rock-drill bits are also given.

HOLLOW-SHAFT MOTORS—The Louis Allis Co., 427 E. Stewart St., Milwaukee 1, Wis., has published a 4-p bulletin, No. 2050, on "Climatized," vertical hollow-shaft motors. These open drip-proof motors are for shallow and deep-well turbine pump applications. The publication stresses the climate-proof security, improved thrust bearing design, metered lubrication and a protected bearing system.

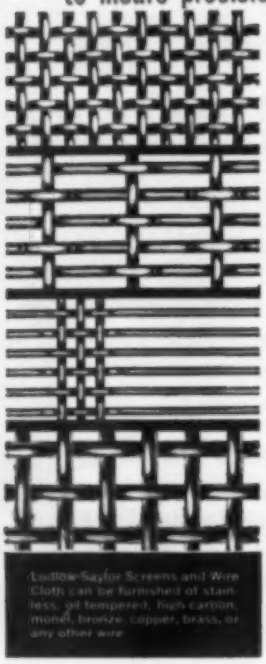
WIRE-CABLE GUIDE—"Guide to Representative Wire, Cable and Conduit Manufactured by Rome Cable," a new technical bulletin which describes general characteristics and uses for most of the firm's products, is now available from Rome Cable Corp., Rome, N. Y. The bulletin includes information on insulation and sheathing materials, bare and weatherproof wires, magnet wires, machine tool and control wires; common terms for all Rome Cable trade names are listed also.

CARBURIZED STEEL—Gardner-Denver Co., Quincy, Ill., has a new publication, "Mining Clipboard," which features articles on carburized steel for improving the quality of drill rods. The article points out that for many years percussion steel has been inadequate for heavy-duty service because of metallurgical and mechanical shortcomings. It goes on to tell how Gardner-Denver engineers and metallurgists have met the problem.

NUCLEAR PLANTS—A new 8-p booklet, "Instrumentation and Control of Nuclear Plants," is now available from Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa. Illustrated with many actual control photographs and system schematics the booklet covers: reactor power control, reactor nuclear instrumentation, and radiation monitoring.

CONSTRUCTION EQUIPMENT—Le Roi Div. of Westinghouse Air Brake Co., Milwaukee 1, Wis., makes acquirable a new 8-p bulletin, CG-15, describing and illustrating products for construction turned out by the company. It includes photographs and data on all air-compressors, air tools, including breakers, drills, tampers and spades; and of one-use drill bits.

LUDLOW-SAYLOR designs and makes its own wire crimping dies to insure precision weaving and dimensional stability



Ludlow-Saylor Screens and Wire Cloth can be furnished of stainless, oil tempered, high carbon, monel, bronze, copper, brass, or any other wire

No guesswork here! To produce L-S crimping dies requires engineering knowledge of all physical and chemical characteristics of many kinds of wire, production know-how, skillful tool making plus critical supervision.

Such careful methods are typical of Ludlow-Saylor manufacturing. That is why L-S Super-Loy Screens are tougher and stronger, more rigid and accurate. They wear longer, stand up better under every operation condition—yet cost no more than ordinary screens.

Immediate Shipment of most weaves and sizes

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WIRE CLOTH COMPANY

609 S. Newstead Ave. • St. Louis 10, Mo.

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SALES OFFICES: Birmingham, 1727-6th Ave. N.; Chicago, 5708 W. Diversey; Pittsburgh, Union Trust Bldg.; Houston, 1213 Capitol Ave.; Denver, 1530 Carr St. WEST COAST SUBSIDIARY: Los Angeles, Star Wire Screen and Iron Works, Inc., 7515 San Fernando Road.

Morton "Formula 5" with rust inhibitor protects your coal and your equipment

"Formula 5" is the safest, most effective freezeproofing compound you can buy. Morton "Formula 5" is specially compounded to meet the requirements set up by coal producers. Unlike ordinary freezeproofing compounds that contain corrosive chlorides, non-toxic "Formula 5" has a rust inhibitor added to help protect you (and your customers) against corrosion of motors, conveyors and other equipment.

Effective even at sub-zero temperatures, "Formula 5" not only keeps coal free-running for your customers, it also is ideal for use anywhere around your mine where icing is a problem.

"Formula 5" is economical to use

In addition to being a multi-purpose freezeproofing compound, "Formula 5" needs no mixing, no special handling. It won't cause costly delays by caking or lumping in feeders. It's a free-flowing product composed of chemically treated sodium chloride (30-70 mesh) and a special anti-corrosive compound. Just apply dry direct to coal.

"Formula 5" is treated to produce an ideal dissolving rate so that little of it is lost during initial drainage. This means more effective, more economical freezeproofing.

Send for free technical help today!

☐ *Please send me your free booklet, "The Key to Low Cost Freezeproofing Application."*

☐ *I also would like a Morton Consulting Engineer to assist me, without cost or obligation, on problems of freezeproofing and equipment maintenance.*

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MORTON SALT COMPANY

INDUSTRIAL DIVISION

Dept. CA-12, 120 So. LaSalle Street, Chicago 3, Illinois

News Roundup

THE "RIVER QUEEN" grabs an 80-ton load of rock and earth in a single bite.

Stripping Shovel Design Acclaimed

A $5,000 award was presented to the designer of "River Queen," a special long-range stripping shovel equipped with a 55-cu yd dipper. The machine, which was highly praised for its engineering features, was introduced to industry last May, and is now stripping overburden at an open-pit coal mine in western Kentucky.

Tom Learmont, Bucyrus Erie, a mining engineer, was the principal designer of the 2,400 ton shovel, one of the largest mobile land machines ever built in the United States. It is taller than a 13-story building, heavier than a Navy destroyer, and is able to take more than 80 tons of rock and earth overburden in a single bite. Welding saved 22% in weight, 15% on material costs with a new manufacturing savings of 24%.

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Crucible Acquires New Coal Reserves

Crucible Steel Co. of America, questing for insurance that operations will be able to continue in the future without obstacles, purchased rights to 15,000 acres of additional coal reserves in Hugheston, W. Va., southwest of the Kanawha River. Company spokesmen say that at Crucible's present rate of consumption, the newly obtained tonnage, along with other coal holdings, will last for 40 yr; important also is the fact that operations at Crucible's present mine at Greene County, Pa., will project past the previous 18-yr forecast to as much as 35 yr.

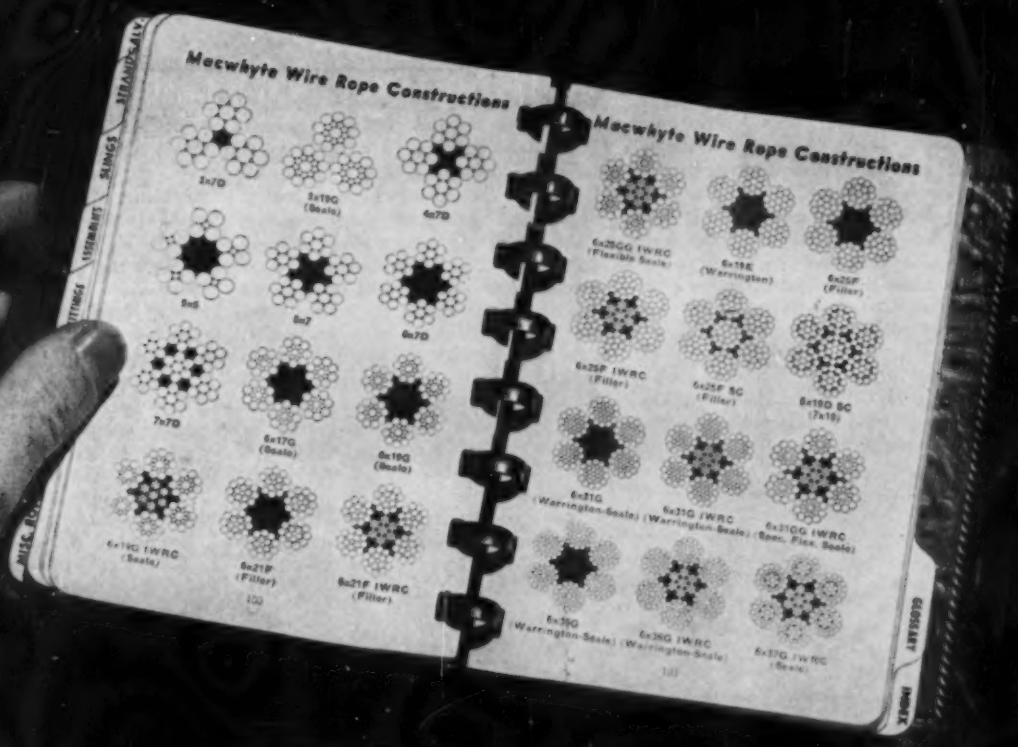
The new West Virginia acreage is a combination of properties in the mountainous terrain around Hugheston. In-

(*Continued on p 126*)

Mine Safety Award Presented

The men and officials of the Green Diamond mine, located in Marissa Ill. and operated by Mid-Continent Coal Corp, a subsidiary of Snow Hill Coal Corp., were awarded the second certificate by the U.S. Bureau of Mines for the completion of 100% retraining in the accident prevention course of the bureau. The employees of the mine have received four awards by the Joseph A. Holmes Association for an outstanding safety record; the mine has produced 5,300,000 tons of coal since its opening in 1949 without a fatal accident. The retraining award is the first to go to a coal company in the United States, and is a symbol of the continuing efforts and cooperation at the mine to prevent accidents.

MEN OF THE GREEN DIAMOND MINE, Marissa, Ill., displaying safety plaque.



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WHYTE STRAND

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Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel and Plastic Coated Wire Rope, and Wire Rope Assemblies. Special catalogs available.

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1125

cluded are 8,000 acres leased from the David Ward heirs, with Valley Camp Coal Co. selling its previous leasehold; 4,500 adjacent acres of virgin coal owned by Lewis Holding Co., and 2800 more acres leased from Kanawha & Hocking Coal Co.; all of this land will be developed as a unit mine.

The mine is expected to yield in excess of 20 million tons of No. 2 Gas seam high-volatile metallurgical coal. It is said to be a superior quality coal with low ash and sulfur content, which, when mixed with Crucible's Pittsburgh seam coal, will yield a materially improved coke for use in the blast furnaces at their Midland, Pa. works.

An increased work force will be required. Valley Camp recently suspended operations at its Hugheston No. 3 mine, idling about 150 employees. This basic work force will be offered employment by Crucible, with increases as soon as a step-up in operations can be effected.

SCHOOL CHILDREN make exhibits illustrating important uses for coal.

School Children Study Coal

Miss. Ruth K. Stroh, of Cockeysville, Md., sent us a short story describing her experiences in teaching the story of coal to school children. Entitled, "Coal Serves," the article said in part. . .

Atoms may come, and atoms may go, but coal "goes on forever!" Thus went a saying during schoolroom discussions of coal, and its values. That mankind is served immeasurably by coal was evident in all the studies undertaken. Amazing to teachers is the fact that even in areas where coal is mined, or widely used, children often are not aware of its values and place in modern civilization. Children are surprised to know that coal is a form of diamond. They grasp eagerly for an understanding of why this is so.

Students abound with ideas on how to depict and culminate their learnings about coal. Many exhibit ideas are used. Practically all of them point up the inherent values and potential of coal. For children of the atomic age, this is notable. Exhibit materials serve to be very dynamic, especially because a first-hand experience or excursion may be impossible for the class. Therefore, exhibits must be the kind that make lasting impressions. Usually, coal occupies the center of interest, real, or by cut-out, or papier-mache modeling. A caption tells in a phrase the nature of the display, which though simple, conveys the impression that coal is indispensable to man.

UMW Loses In Law Suit

Federal Judge William E. Miller awarded the Meadow Creek Coal Co. $400,000 damages against the United Mine Workers of America a short time ago as a result of a 1948 organizing strike in Putnam County, Tenn. The award included $300,000 in actual damages and $100,000 in punitive damages because of the "wilful and malicious conduct of the defendant in closing the plaintiff's mine and interfering with its business."

The findings included the following: that the union's representatives began to organize workers at various Tennessee mines as early as 1944 and succeeded in organizing workers in several mines other than the one operated by Meadow Creek; that the defendant, being unable to recruit most of the plaintiff's employees, determined to close down the plaintiff's mine by force; that to do so, the defendant conspired to and went on the property of the plaintiff in large numbers and armed, which frightened people connected with the plaintiff's mine.

The judge also found that on June 23, 1948, a portion of the Tennessee Central R.R. spur track to the mine was destroyed by a dynamite explosion and that "from all the circumstances in the case it is a reasonable conclusion" that the "defendant is responsible for the dynamiting."

Huge Shovel Now Operating

A new electric shovel, the largest in the world, is now uncovering coal seams at Peabody Coal Co.'s River King mine, Freeburg, Ill. Built by Marion Power Shovel Co., the machine weighs 2,895 tons, and uses as much electricity as the homes and industries in a town of 10,000 people. Scooping up 105 tons (70 cu yd) in a single bite, the shovel is the main cog in Peabody's modern operation.

After the seams have been uncovered, a smaller shovel in the pit loads coal into 55-ton haulage trucks for the trip to the preparation and washing plant, first to be entirely sheathed in stainless steel, according to the company. The washing capacity of the plant, which employs a flotation process, is 1,000 tph.

The company owns a 33-mi railroad line from the mine to East St. Louis, Ill., where it connects with major trunk lines. Coal moves from the plant to the River King barge-loading dock, one of the largest heavy-duty docks on the inland waterway system. Thirty barges may be waiting to receive their cargo. Coal moves on a 48-in wide conveyor belt to the barges that can be moored at 16 mammoth steel caissons. A company-owned switching boat maneuvers the barges into position for loading. Capacity is 1500 tons per hr. Using these modern facilities, Peabody Coal Co. feels that it is geared to serve Mid-America's expanding economy.

Powwow Produces Land Contract

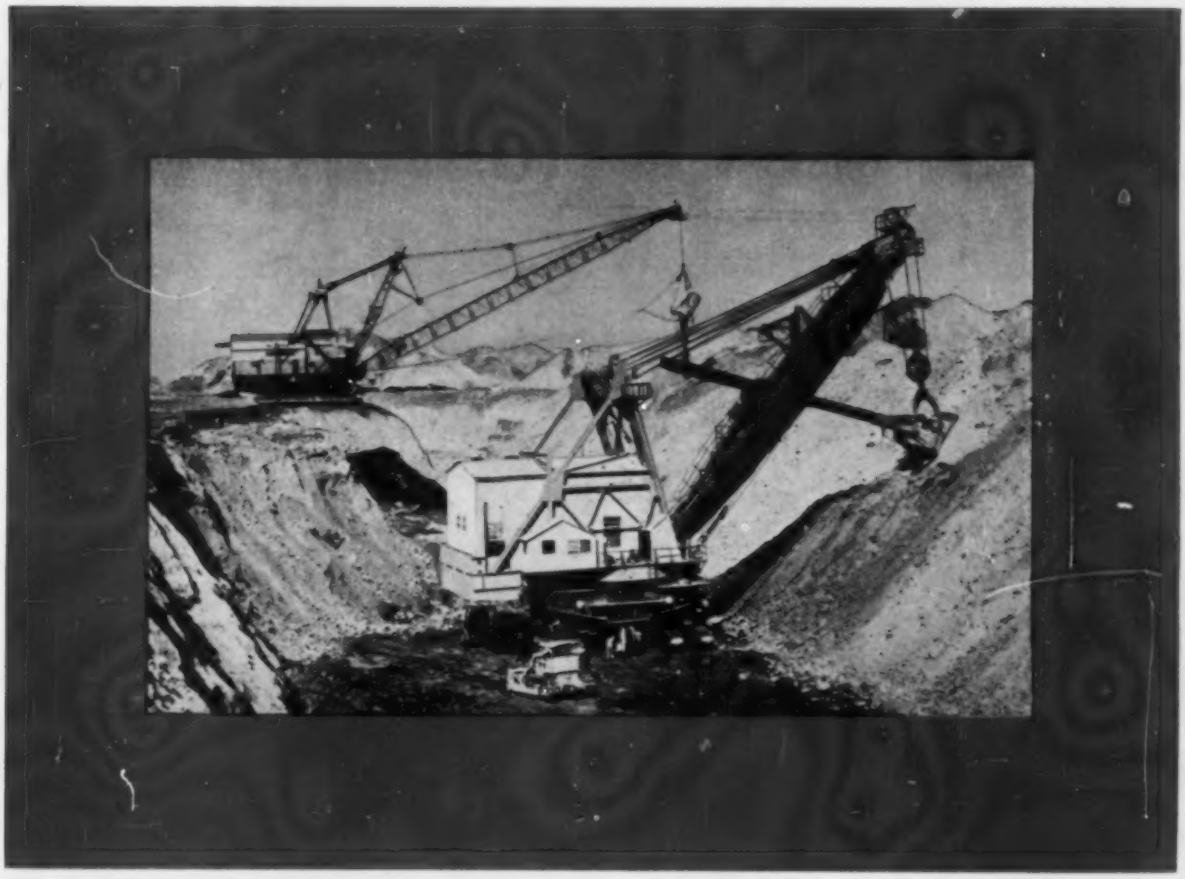
U.S. Indian Commissioner Glen L. Emmons has approved the leasing of 24,000 acres of Navajo Indian lands in northwestern New Mexico to Utah Construction Co., of San Francisco, for coal mining and electric power development. The company has under consideration a plan to build a 1-million-kw steam plant near Farmington, N.M., that would be operated on coal from extensive deposits on the leased property, located in the Four Corners area. Utah said it has not yet made a firm decision to go ahead.

The lease is for 10 yr and will continue after that "so long as coal is produced in paying quantities." The land covered is 25 mi long and no more than 2 mi wide on the Navajo reservation, south of Fruitland. The agreement guarantees the Navajo tribe a rental of 25c an acre for the first year, 50c the second year and $1 an acre thereafter. Rentals will be credited against future royalty payments at the rate of 15c a ton for coal and 10% of the value of other mineral products, except uranium, for which another schedule has been established.

Paul Jones, Navajo Tribal Council

188 King St. • Los Angeles 21, 2035 Sacramento St.

STEP UP winter production with the right cold weather lubricants!



SWING OVER TO AMOCO and stop lazy lubricants from slowing production. In cold weather stripping or deep mining, Amoco Mine Lubricants flow easily, freely, without stiffening. You get bigger production while you cut lubrication costs per ton. For power shovel or cutting machine, easy-handling Amoco Mine Lubricants are the answer to lubrication needs *all through winter!*

AMOCO LUBRICANTS

FOR MINE MACHINERY

Higher Quality . . . for Better Lubrication . . . at Lower Cost

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chairman, approved the lease which also stipulated that Navajo Indians will be given employment preference in the mining and power operations. If a power plant is erected, under the terms of the lease the company is required to sell power on the reservation at wholesale rates.

Factory-Assembled Steam Plant

The nation's first completely factory-assembled coal-fired steam plant went into operation recently at Walter J. Engel, Inc., largest hothouse rose grower in central Ohio. The new heating plant represented more than a "first" for the manufacturer, International Boiler Works, East Stroudsburg, Pa. It represents more than 3 yr of research for the Bituminous Coal Research, Inc.

Paul Kock, project engineer for BCR, described the 200-hp boiler as automatic, adjustable to use of any grade of coal, highly efficient, and with a normal rated capacity of 6900 lb of steam per hr. He said that he worked on the design and application of new heating techniques in the boiler for 3 yr before the first commercial plant was installed. He tested the laboratory model for 11 mo during which time he concluded it has a 75 to 85% coal-consuming efficiency, compared with 50 to 75% efficiency of other units of comparable size.

Some competitive advantages, it is stated, are low installation costs due to being shipped completely assembled ready for use, and self-compensating features that make adjustments unnecessary when one grade of coal is substituted for another. Equipment costs are competitive with heating plants fueled by gas or oil, BCR reports, and other possible users of the new steam plant are watching Engel's test run with interest.

News Briefs

Big Muddy canalization project site was displayed last month.

Officials of six southern Illinois coal companies were hosts for an inspection trip by Col. Charles B. Schweizer, engineer for the St. Louis district of the U.S. Army Corps. of engineers.

Sources report that railroad traffic officers have decided to increase freight rates selectively, as recommended by the Interstate Commerce Commission.

Tariffs incorporating these increases will be published soon on 30-day notice, and will be subject to protest and possible suspension. Proposed increases are said to be around 3%, a maximum of 15c per net ton applying to coal shipments west of the Mississippi.

By a two to one vote, the Interstate Commerce Commission recently reversed its suspension board by suspending proposed reductions in fine coal rates from mines in Alabama, Kentucky, Tennessee and Virginia to Tampa, Fla.

These proposed reductions, ranging from $1.65 to $2.06 per net ton, were published to become effective Oct. 28.

The Illinois Freight Association has disapproved the railroads' proposal to lower rates on volume movements of fine coal from Indiana mines to Indianapolis and Michigan City, Ind., by 35c and 50c per ton, respectively.

Rene Mayer, president of the European Coal & Steel Community, praised the United States' role in the work of the community.

He said to a group of coal and steel producers from the United States; "If the credit of the community's high authority is today well established, it is partly due to you."

One of the most significant developments in regard to the application of Midwestern Gas Transmission Co. to import natural gas into the United States from Canada via the Trans-Canada pipeline occurred recently in the Canadian Parliament.

Prime Minister Diefenbaker stated that his government would make no decision on the proposed export of Canadian natural gas to Midwestern until after the Border Royal Commission has completed its studies and recommendations.

A total of 11,270 yr in the mines of Eastern Gas & Fuel Associates and predecessors are represented by 547 mine workers at Eastern's 14 mining locations in West Virginia and Pennsylvania, who will receive 1957 service pins at presentation ceremonies.

Individual awards are made at 5-yr intervals for from 20 to 50 years of service. Several have received 50-yr pins in previous years.

A Pittsburgh Consolidation Coal Co. official said recently that bituminous

Preparation Facilities

Truax-Traer Coal Co., Ceredo, W. Va.—Contract closed with the Kanawha Mfg. Co. for belt conveying system to convey ⅜ x 0 dried coal between existing unit; complete with steel supporting gallery; capacity 350 tph.

Clear Creek Coal Co., Clearco, W. Va.—Contract closed with the Kanawha Mfg. Co. for screening installation to separate mine-run into two sizes; capacity 130 tph.

Armco Steel Corp., Montcoal, W. Va.—Contract closed with Kanawha Mfg. Co. for coal storage system consisting of 750-ton Armco bin, lowering ladder and Traylor feeder and belt conveyor for recovering coal from bin; also additional washing facilities including new compartment for Jeffrey Baum jig with relating accessories.

Slab Fork Coal Co., Slab Fork, W. Va.—Contract closed with Kanawha Mfg. Co. for underground dumping system consisting of Nolan rotary dump, hopper and electric feeder to deliver to existing slope-belt.

Hi-Hat Elkhorn Mining Co., Hi-Hat, Ky.—Contract closed with Kanawha Mfg. Co. for fine coal recovery system consisting of Heyl & Patterson 3-in cyclones and Eimco disk filters.

Slab Fork Coal Co., Slab Fork, W. Va.—Contract closed with Jeffrey Mfg. Co. for 1-compartment addition to a 2-compartment jig; 60 tph increase and 6 x 0-in coal.

Crozer Coal & Land Co., Lynco, W. Va.—Contract closed with Fuel Process Co., for M-8 heavy media coal washer with auxiliary pumps, screens, magnetic separator, etc; 6 x ¼-in raw coal plus ¼ x 8-in mesh air table refuse; 250 tph capacity; replaces present hydro-separator with date of completion of installation set for Jan 2, 1958.

National Mine Service Company

New Convenience and Economy for users of

Clarkson* "Redbird" Conveyor Chain

Clarkson "Redbird" Conveyor Chain, standard of the industry for economy and durability, is now stocked and distributed in all major coal fields by National Mine Service Company. The regularly scheduled truck deliveries which established the National Mine reputation for service will now bring you Redbird chain—already assembled in lengths for convenient handling.

To gain maximum strength and balanced construction, Clarkson Redbird flights and flight pins are welded together—forming an integral unit. This type of construction also facilitates replacement, since it is necessary only to break the cottered chain and insert the new flight assembly. Longer chain life, reduced downtime, less adjustment and fewer replacements make Redbird the most economical chain available.

Your National Mine representative will be glad to show you how Clarkson Redbird can reduce your chain costs.

**Clarkson Manufacturing Co., now Clarkson Division of National Mine Service Company.*

National Mine Service Company

564 Alcoa Building • Pittsburgh 19, Pennsylvania

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Ashland Division, Ashland, Ky.
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Western Kentucky Division, Madisonville, Ky.
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GENERAL CABLE!

SUPER SERVICE

PORTABLE POWER and MINING CABLE

5 KV *Super Service* Type SH-D cable at work on the $50,000,000 Great Salt Lake fill project. Morrison-Knudsen Company selected *Super Service* as the most dependable, long-lived shovel power cable for hard service in rugged terrain.

UNBEATABLE PERFORMANCE

under toughest service conditions

Exclusive construction features give General Cable's *Super Service* portable power cable superior durability and long life under the most severe conditions. *Supertuf* mold-vulcanized neoprene sheath has unequalled resistance to wear, cutting and other mechanical abuse. Double-layer cord reinforcement adds extra strength. Sheath has outstanding resistance to water, oil, acids, alkalis, flame, sunlight and weathering. Available in a *complete* line from 600 V to 15 KV.

GENERAL CABLE CORPORATION, 420 Lexington Avenue, New York 17, N.Y.
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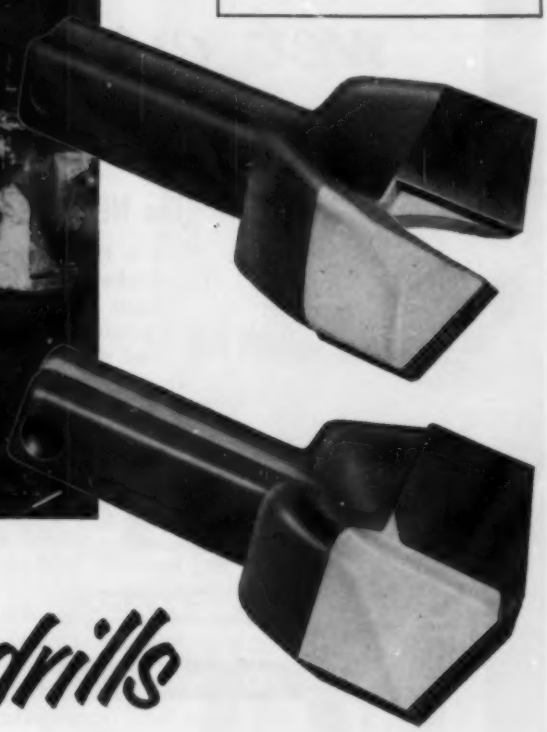
for quality and service... specify **GENERAL CABLE**

Fletcher Roof Bolting Machine

Styles SS and TT Bit in 1-1/2" diameter only available with white shanks for easy identification of "starter" bits



Carmet roof drills

ARE ENGINEERED FOR FAST, RUGGED DRILLING

One look at the sturdy construction of Carmet roof bits and you can see why they consistently drill clean, accurate holes . . . even in the hardest strata. They're built to withstand the stresses of the heaviest roof bolting machinery. They're designed for fast penetration at lower feed pressure.

Notice, for instance, the heavy steel backing of the shank at the cutting tip. This permits the use of a superior, more wear resistant grade of carbide for maximum tool life. It prevents premature "massive" carbide fracture which often accounts for up to 50% of total bit cost.

That extra carbide wear length along the outside cutting edge helps you to maintain proper hole gage through the life of the tool . . . you get more holes per regrind and more regrinds per bit. These are just a few of the Carmet "extras" that add up to all around lower drilling costs per ton.

Call your Carmet distributor for a demonstration of the cost cutting advantages of Carmet roof drills. He'll be glad to assist you in setting up a tool program to suit your operations. ***Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Mich.***

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Persinger's Inc., Charleston, W. Va.
Union Supply Co., Denver, Colorado
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W. B. Thompson Co., Iron Mountain, Michigan

Write for your copy of the CARMET MINING TOOL CATALOG and METHODS MANUAL

Illustrates full line of Carmet mining bits . . . giving tool dimensions, rake and clearance angles, etc. Specifies grinding wheels and procedures for reconditioning tool bits.

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The Original DOUBLE-BONDED Carbide Bit

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WBW 8881

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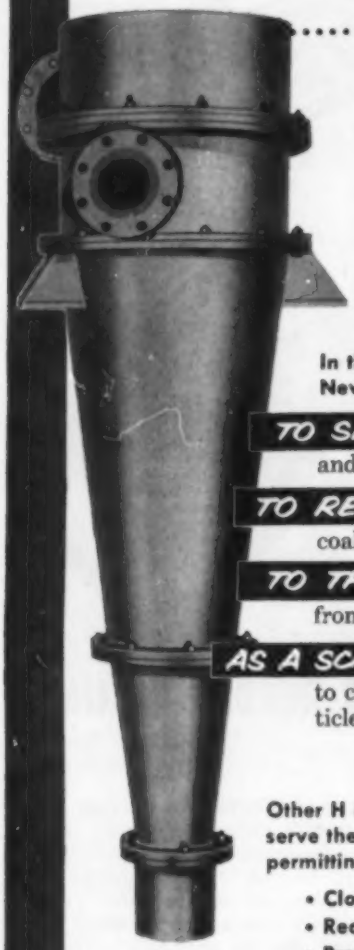
wet cyclones



H & P
24" Cyclone

The NEW H & P 24" Cyclone

is a High-Capacity primary thickener or coarse classifier. Each 24" Cyclone can process up to 2000 GPM at 20 PSIG feed pressure. Processing costs per gallon are exceedingly low.

In the Coal Preparation Plant, the New H & P 24" Cyclone is used:

TO SIZE raw coal ahead of coarse and fine coal washers

TO REPLACE space-consuming raw coal and clean coal sludge tanks

TO THICKEN the product coming from wet concentrating tables

AS A SCALPING UNIT in jig circuits to clarify and remove large coal particles from circulating water

Other H & P Cyclones, starting from 3" dia., serve the coal industry by the thousands . . . permitting

- Closed circuit operation
- Recovery of fine coal
- Prevention of stream pollution
- Control of washing water density
- Conservation of water
- Sharp classification for washing operation

For the most economical classifying and thickening operation investigate the H & P Cyclones. Get all the facts . . . Write for booklet 1157 today!

70 YEARS OF SERVICE

Heyl & Patterson INC.

55 FORT PITT BLVD., PITTSBURGH 22, PA., COurt 1-0750

News Briefs *(Continued)*

production will fall 4% short of earlier forecasts this year, and may drop another 4% in 1958.

George Lamb, manager of business surveys for the world's largest commercial coal producer, said an uncertain European market and domestic slackening in general business activity are responsible for the pessimistic outlook.

Some 12,000 miners stayed away from their jobs in southwestern Pennsylvania on Nov 5, in sympathy over the layoff of 83 men at Crucible Steel Co. mine near Waynesburgh.

United Mine Workers Local 4731 charged that Crucible ignored seniority rights when it furloughed the 83 men. The company reportedly offered to take back 43 men, but insisted that it must cut 40 men over 60 yr of age and place them on pension.

John L. Lewis, president of the United Mine Workers of America, sent the following letter to Edward G. Fox, president of the Bituminous Coal Operator's association.

"Adverting to the Christmas vacation provision in the National Bituminous Coal Wage Agreement, the undersigned authoritatively advises as follows: That in the absence of negotiation and agreement between the parties, which has not yet eventuated, no contractual obligation exists for the idling of mines during the forthcoming Christmas 1957 period or the payment of vacation monies."

Plains Township, Pa., commissioners have requested the Hudson Coal Co. to take action to eliminate a smouldering peat bog along the DuPont Highway, it was disclosed.

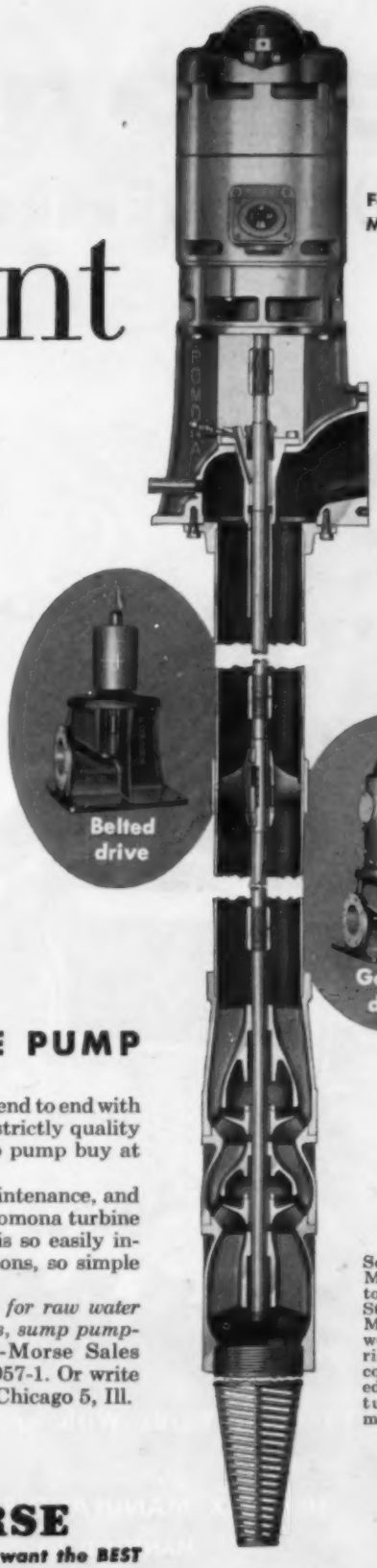
The fire in a dried swamp bed was started about two weeks ago by a forest blaze, which was later extinguished. Efforts to put out the peat bog fire, however, were unsuccessful, and it was indicated a bulldozer will be needed to smother the flames.

The River Queen Coal Co., near Central City, Ky., opened its 1,800-ft canal for transport of coal from the mine to Green River.

Reports say that the canal will accommodate 16 barges. The company's giant tipple began processing coal at the rate of 1,000 tons an hour, according to the superintendent there. Cars of the Louisville & Central railroads load at the tipple. After rail transport, barges carry the coal to utility plants in the Ohio Valley.

The Atomic Energy Commission has issued a permit to Yankee Atomic Electric Co., for construction of a pressurized water power reactor near Rowe, Mass.,

You'll want to look into this pump



NEW F-M POMONA WATER-LUBRICATED TURBINE PUMP

Here is an all-new, extra rugged pump designed from end to end with the cost-conscious user in mind. A close look at its strictly quality features reveals why it's recognized as today's top pump buy at *any* price.

For ruggedness of construction, simplicity of maintenance, and strictly quality design throughout, this new F-M Pomona turbine pump is today's greatest value. No other pump is so easily installed, so easy to adjust for varying field conditions, so simple to change between electric, belted or geared drive.

Ask for details on this new F-M Pomona pump for raw water supply, air conditioning, refrigeration, cooling towers, sump pumping, dewatering, etc. Contact your Fairbanks-Morse Sales Engineer today. Ask for new illustrated Bulletin 6957-1. Or write Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

Seven Fairbanks-Morse pump factories in the United States, Canada and Mexico build the world's greatest variety of hydraulic combinations offered by any manufacturer of liquids-moving machinery.

FAIRBANKS-MORSE
a name worth remembering when you want the BEST

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

"MH" HENDRIX
Heavy Duty Mining Buckets

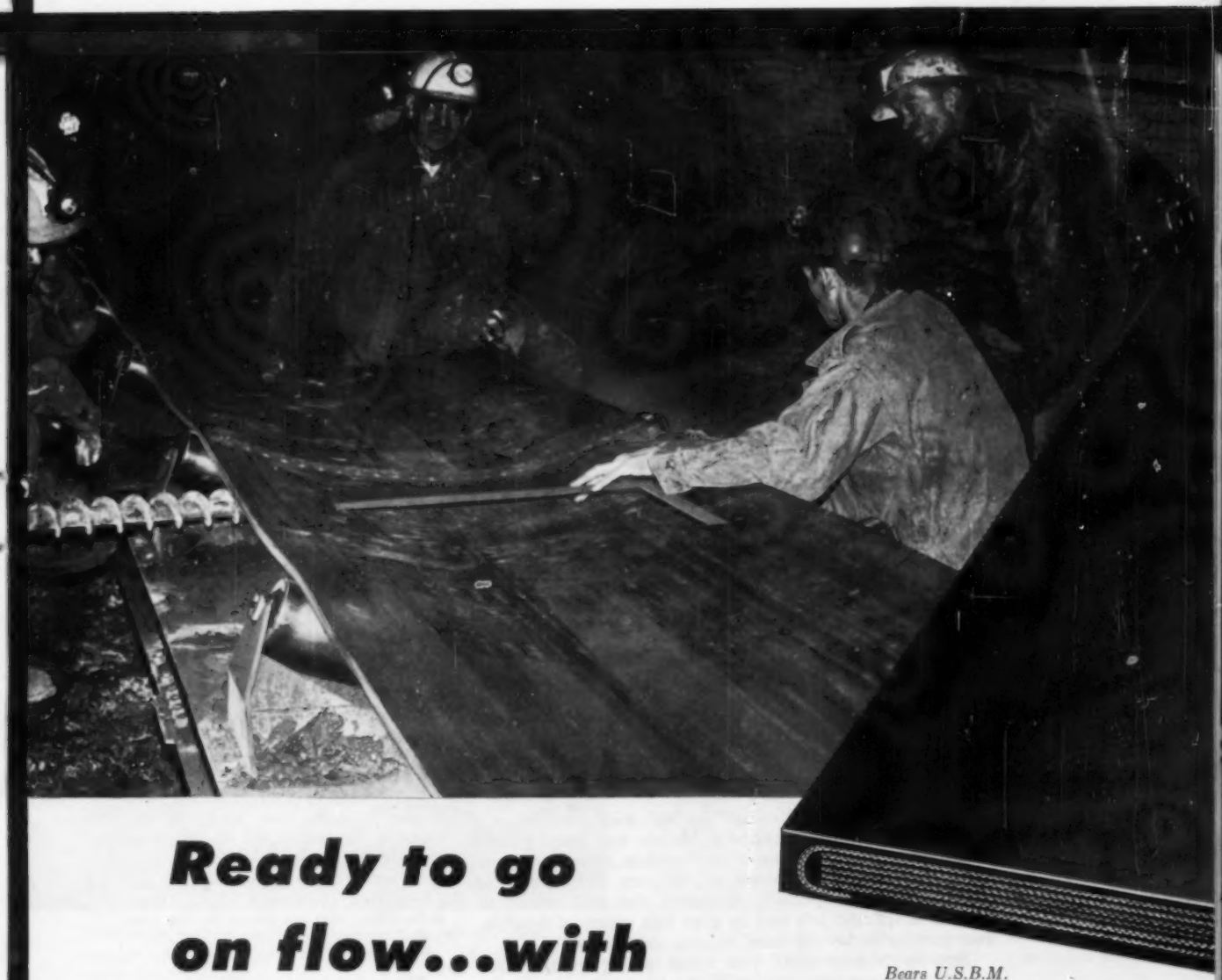
...for the toughest operations

Increased bucket width, higher arch and tapered basket provide unsurpassed digging, loading and dumping ability in mining operations...for greater production at the lowest cost-per-yard.

4½ to 14 Cubic Yards With or Without Perforations

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

Hendrix DRAGLINE BUCKETS



Ready to go on flow...with Thermocoal Belting

Bears U.S.B.M. acceptance designation #28-13.

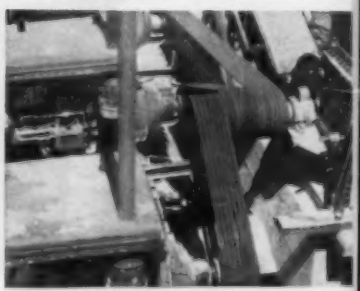
Tough . . . fire-resistant . . . long-wearing, Thermocoal conveyor belting is used by profit-minded mine operators everywhere.

Here's belting that bears acceptance designation # 28-13 of the U. S. Bureau of Mines . . . meets or exceeds all after-flame and after-glow tests. It's rugged belting, with high resistance to flexing and impact, edge wear, abrasion and mildew.

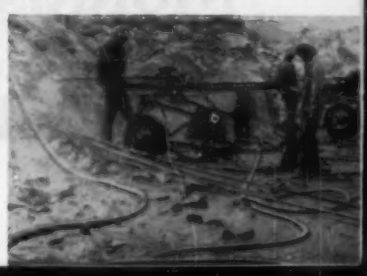
Specify construction of cotton, cotton-nylon or rayon duck. All are impregnated with specially compounded Thermoid rubber stocks for long, economical service.

Order Thermocoal Belting through your Thermoid distributor, or write direct for detailed information and data sheets.

Cut costs with Thermoid Multi V-Belts . . .



. . . and Thermoid Hose



Thermoid

Thermoid Company
Trenton, New Jersey
Nephi, Utah

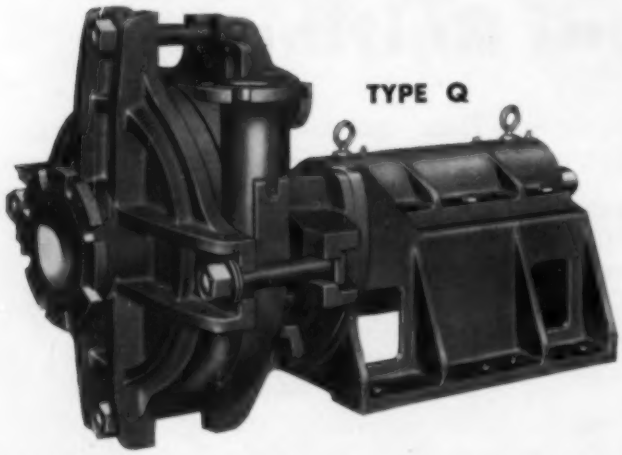
misfits cost money...

Coddling old pumps, "bargain" pumps or pumps that weren't engineered for the job can be an expensive proposition.

When misfits like this are put to work, they generally can handle only half the job they should. Often their "downtime" is greater than their operating time. And when pumps fail the greatest cost is not for repairs—but for lost production.

Start today by replacing "misfits" with new Morris pumps. For nearly a century Morris has been manufacturing a complete line of top quality pumps to meet the diversified requirements of industry. Every Morris pump has been specially designed and engineered to handle a specific job and to give you years of trouble-free service under the most rugged conditions.

Specify Morris when you want lasting pump value . . . it will save you money in the long run.



MORRIS CENTRIFUGAL PUMPS

● Free Service. Morris Engineers will be glad to recommend the pump best suited to your needs for size, capacity, etc. Send necessary data today to Morris Machine Works, Baldwinsville, N. Y.

News Briefs (*Continued*)

to produce 134,000 kw of electricity.

Issuance of the permit follows conclusion of a public hearing held in accordance with the Atomic Energy Act as amended by the 85th Congress. At a session of the Commission on October 30, 1957, the Commission, after consideration of the evidence presented during the hearing, ordered that the construction permit be issued.

Over 177,000 homes in the Tennessee Valley are using complete electric heating systems it was recently computed.

Excluded from this count are many dwellings that use electricity for auxiliary heating or for warming spot areas in early fall or late spring before or after a fuel-fire furnace is placed in operation.

The coal pipe line is successfully carrying test runs since the accidental plugging last summer, according to James Hyslop, president of the Hanna Coal Co.

To prevent any such future plugging, the new crushing equipment is being installed before the line goes into full use.

James Benedict of Benedict, Inc., McArthur, Ohio, has been named by the board of directors to the presidency of the Ohio Reclamation Association.

He replaces retiring president Richard James, James Brothers Coal Co., Magnolia, Ohio, who has served for the past 2 yr.

The giant shovel of Simco-Peabody Mining Co. is nearing completion at Conesville, Ohio, in Coshocton county.

Built by Marion Power Shovel Co., reports say it is the same shovel as the Hanna Coal Co. "Mountaineer," but with shorter boom and larger capacity bucket. The coal mined by this shovel will supply the new generating plant of the Columbus and Southern Ohio Electric Co. across the Musingum river from Conesville.

A nationwide organization of firms, including Canadian, engaged in repair of machinery and metal parts used by steel, chemical, coal, oil, marine and other heavy industries, has established its own trade group known as the American Metal Repair Association, with headquarters in the Investment Building, Pittsburgh, Pa.

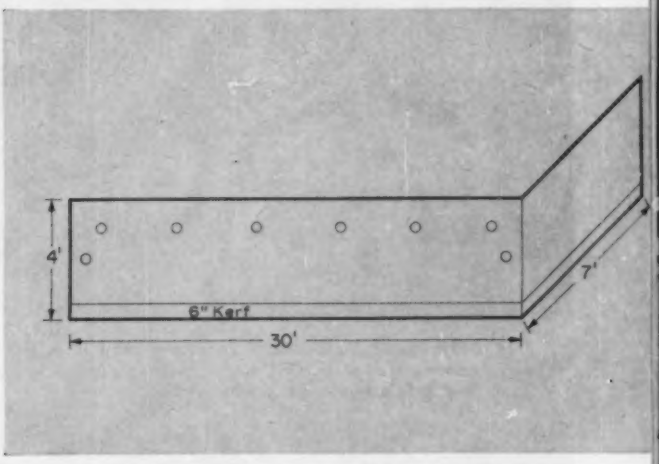
The member firms specialize in repair of steam and gas turbines and engines, diesel engines, heavy forming presses, flywheels, pressure vessels, mill roll housings, and heavy marine equipment.

The Pocahontas Fuel Co.'s Crane Creek coal cleaning and preparation

Mine foreman marking off shot holes prior to drilling. The undercut has already been completed. Note the clean face produced by the previous shot.

Loading out a fall of coal shot with Du Pont "Lump Coal" C, 1 ½ x 6, which produces a large percentage of coarse coal every time.

Coal on its way to the tipple. Uniform lump, quite evident here, is necessary for good loadability required when working on low profit margin.



Du Pont technical servicemen worked closely with the company to develop this shot pattern which produces maximum amount of coarse coal.

Du Pont "Lump Coal"® C maintains loadability needed for profitable operation

"We use Du Pont "Lump Coal" C permissible dynamite exclusively," says Mr. Sid Young, superintendent, Borderland Collieries Co., Borderland, Kentucky, "because it consistently gives the good loadability necessary for profitable operation.

"When working on a low margin of profit, it is mandatory that coal be moved from blasting point to shipping point at maximum speed. Any reduction in loadability would reduce or even eliminate our profit.

"Using Du Pont "Lump Coal" C, we consistently get the maximum amount of six- to nine-inch lump. It is this uniform lump size that permits fast loading."

In addition, "Lump Coal" C cleans the coal from the roof in hard-to-work sections. Dust has been reduced by 10% and crews can begin post-blast work promptly after the charge has been fired.

Call your Du Pont representative for more information or write E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT PERMISSIBLES
Blasting Supplies and Accessories

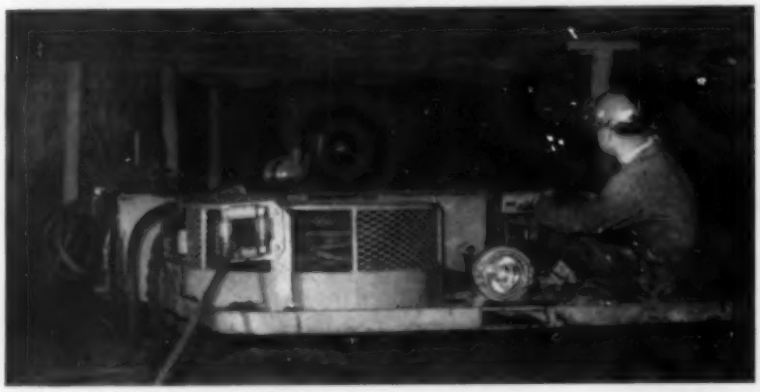
DU PONT

Better Things for Better Living . . . *through Chemistry*

SEE DU PONT SHOW OF THE MONTH ON CBS

Aeroquip Flexible Hose Lines Reduce Downtime on All Mining Equipment

Replace worn or damaged hose lines quickly by assembling Aeroquip Hose and Reusable Fittings right in the mine. A small inventory of bulk hose and reusable fittings meets all your requirements. You save money because equipment gets back on the job faster.



FOR DEEP MINE EQUIPMENT, Aeroquip Hose Lines provide dependable performance under all working conditions. The Aeroquip hydraulic lines on this stoper withstand abrasion, flexing and shock.

FOR STRIP MINE EQUIPMENT, Aeroquip Hose Lines perform well in many jobs. This rock drill, for instance, uses low-cost *SOCKETLESS* Fittings and Hose for engine fuel and air lines as well as Double Wire Braid Hose and Fittings for high pressure hydraulic lines. *SOCKETLESS* is an Aeroquip Trademark.

CALL THE AEROQUIP DISTRIBUTOR LISTED IN YOUR YELLOW PAGE PHONE BOOK

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REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

SOCKETLESS Fittings are Covered by U.S. Patent Number 2,805,088 and Corresponding Foreign Patents and Patent Applications.

News Briefs *(Continued)*

plant, completely remodeled and re-equipped in the past 2 yr, was destroyed by fire.

Officials said the plant, located near McComas, W. Va., would be rebuilt as quickly as possible, but that, meanwhile, the fire would mean unemployment for 200 workers who had been employed there.

The Progressive Mine Workers Union announced that it has asked the U.S. Senate Rackets Committee to investigate the contract relationship between the United Mine Workers Union and the Peabody Coal Co.

It was charged that the UMWA is squeezing out the smaller union in traditionally progressive St. Clair county, Ill., as a result of expansion into the area by Peabody.

Equipment Approvals

Ten approvals of permissible equipment were issued by the U. S. Bureau of Mines during September.

Joy Mfg. Co.—Type 2BT-2H twin bore miner (modified by SBM9174); five motors, two 100 hp, two 15 hp, and one 30 hp, 440 v, AC. Approval 2-1283A, Sept. 4.

J. T. Fish and Co.—Rebuilt type 42E18C shuttle car; three motors, each 7½ hp, 250 v, DC. Approval 2-1284, Sept. 11.

Kersey Mfg. Co.—Types PPC-9 and PPC-10 utility trucks; one motor, 5 hp, 80 v, DC. Approval 2-1285, Sept. 13.

The Jeffrey Mfg. Co.—Type 70-UR cutting machine; two motors, one 50 hp, one 25 hp, 250/500 v, DC. Approvals 2-1286/2-1286A, Sept. 16.

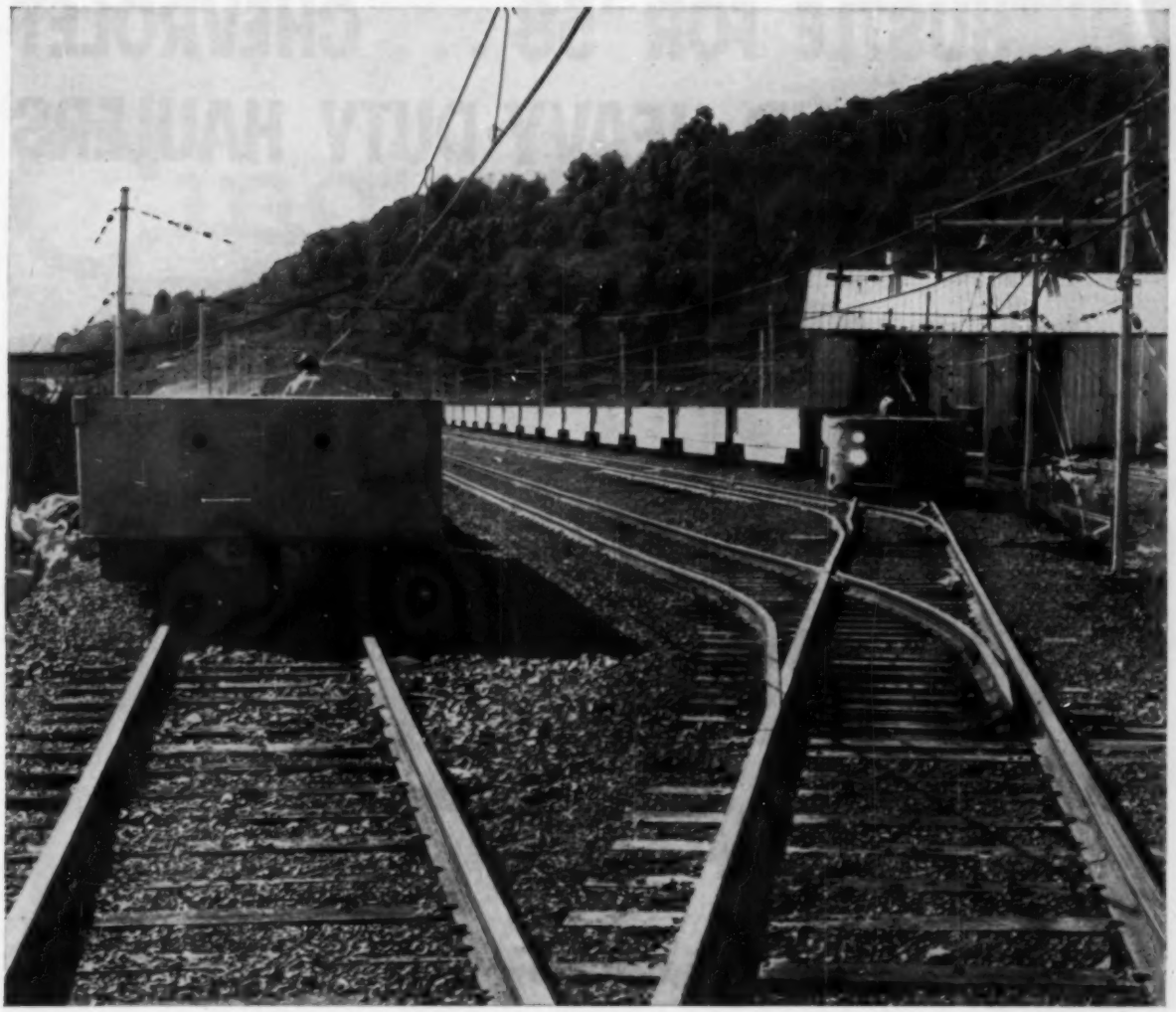
Rochester and Pittsburgh Coal Co.—Portable compressor; one motor, 70 hp, 550 v, DC. Approval 2-1287A, Sept. 16.

Freeman Coal Mining Corp.—Type F.C.I timbering machine; one motor, 10 hp, 230 v, DC. Approval 2-1288, Sept. 17.

The Jeffrey Mfg. Co.—Type MT-67 shuttle car; three motors, each 15 hp, 250 v, DC. Approval 2-1289, Sept. 17.

Goodman Mfg. Co.—Type 420 borer; one motor, 175 hp, 440 v, AC. Approval 2-1290A, Sept. 19.

The Jeffrey Mfg. Co.—Type 61-AMC crawler mounted conveyor; one motor, 50 hp, 250 v, DC. Approval 2-1291, Sept. 24.



Ladder track or whole new lay[illegible]t . . .

Bethlehem will prefabricate it for you

One glance tells you this ladder track is something special. And that's the very point we want to make: *all* Bethlehem mine-haulage trackwork is especially prefabricated to meet the specific needs of the mine.

Let's say you need a ladder-track like this to open up a bottleneck that's hampered your operations. You simply turn the matter over to Bethlehem engineers, and let them work out the best possible design. The first thing they'll do is make a thorough check of the operating routine. Then they'll go into a huddle with specialists here in Bethlehem, who in turn will design the trackwork to fill the bill.

Next step will be taken at our Johnstown, Pa., plant, where longtime trackwork experts will prefabricate the layout right down to the last bolt and splice bar. Only after everything looks good to them will shipment be made to your worksite. Because of this careful attention to detail, you will find that everything goes together with minimum fuss and cost.

Whatever your trackwork needs, you'll save time and money by turning to Bethlehem for a careful appraisal of your needs. A call to our nearest office will start things moving.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

NEW HUSTLE FOR '58 . . . CHEVROLET MEDIUM- AND HEAVY-DUTY HAULERS

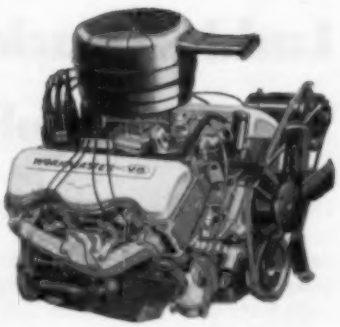
New V8 power! New 6 stamina!

New Chevrolet trucks bring you modern V8 engines with more staying power . . . great 6's built to keep on delivering on job after job after job. And a V8 so new in design it even looks different on the outside!

Here's *modern* truck power from Chevrolet! Standard in middle-weight Series 50 L.C.F. models is a new edition of the Heavy-Duty Taskmaster V8 with 160 h.p. for fleet hauling and new durability features such as Stellite-faced exhaust valves. Standard in Series 60 models is the famous Jobmaster 6 with more power than ever (150 h.p.) and more built-in dependability as well.

And standard power in Series 70 and 80 models is new and better, too! The big Heavy-Duty Super Taskmaster V8, rated at a high 175 h.p. brings you new features that mean dollar-saving efficiency on jobs that work a truck hard.

But that's not all! Series 90 and 100 trucks provide a *new kind* of big truck power, the 230-h.p. Workmaster V8, with revolutionary Wedge-Head design. It develops high power and torque at fuel-saving low r.p.m. See your Chevrolet dealer about Chevy's new brand of hustle! . . . Chevrolet Division of General Motors, Detroit 2, Mich.



All-new Workmaster V8 with Wedge-Head design! Combustion chambers are wedge-shaped to get extra power, top economy from regular grade fuel!

Latest editions of the "Big Wheel" in trucks

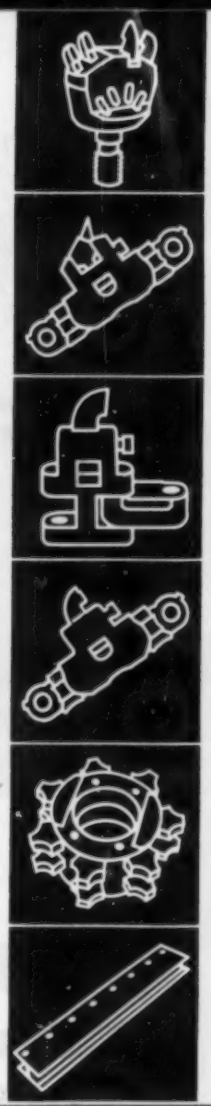
NEW CHEVROLET TASK-FORCE 58 TRUCKS

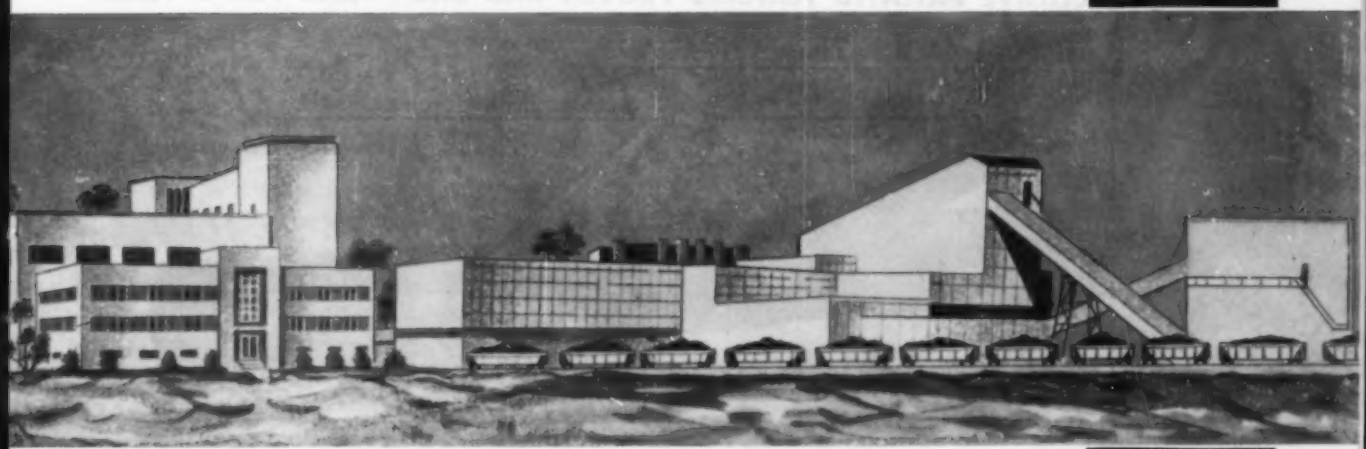
CHEVROLET

Cincinnati...

specialists for over 34 years... manufacturers of coal cutting equipment to meet all conditions

Years of experience, plus a highly trained staff of engineers, researchers, metallurgists and production experts have enabled CINCINNATI MINE to provide more efficient chains, bits and cutter bars for your particular cutting problem. As a pioneer and leader in the manufacture of cutting equipment, we appreciate the close cooperation we have had from mine operators everywhere. Through this cooperation, testing and working together, we feel the entire industry has benefited. Pioneers from the beginning, CINCINNATI *looks* forward to **go** forward with the entire industry.

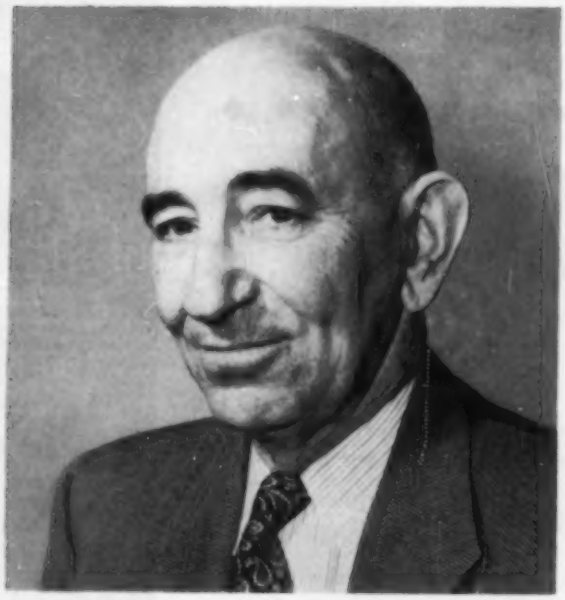




THE CINCINNATI MINE MACHINERY CO.

2980 SPRING GROVE AVENUE · CINCINNATI 25, OHIO

Personal Notes



M. B. GIROD begins his retirement from U. S. Steel Corp.

A Measure Of Success

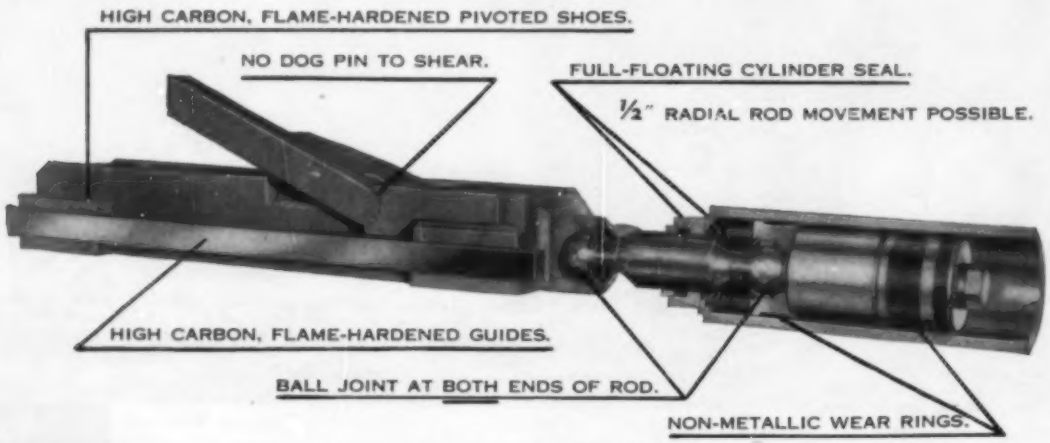
Life's scale is said to balance evenly between failure and success. For M. B. (Mike) Girod, who retired recently from U. S. Steel Corp., as superintendent of the coal division's Frick District, success far outweighed failure. Besides having been superintendent of Robena mine, once the world's largest coal mine, Mike Girod has fathered three children, all of whom are college graduates making names for themselves in business and education.

Born in Mt. Pleasant, Pa., Mr. Girod took engineering and mining courses in night school. He began his coal mining career in 1912 as a chainman and transitman for the H. C. Frick Coke Co., formerly a subsidiary of U. S. Steel, at Scottdale. After serving with the U. S. Army in World War I, he returned to Scottdale in 1919. Rising through successively higher positions during a career that numbered 45 yr, he became a revered and respected member of the coal industry.

Married to the former Carrie McLeon of Masontown, Mike's hobbies include golf, fishing and playing cards. He is a member of the Smokeaters, a charter member of the American Legion Post 423, Masontown, the Uniontown Country Club and the Church Committee of All Saints Church. He will now enjoy more time with his wife and family, as well as a new color television set presented to him by his long time associates of the Uniontown Country Club. Mike Girod has earned his measure of success.

Here's why STAMLERS are BEST!

STAMLER EXCLUSIVE PATENTED FEATURES PROVEN AND UNCHANGED FOR 8 YEARS!


HIGH CARBON, FLAME-HARDENED PIVOTED SHOES.
NO DOG PIN TO SHEAR.
FULL-FLOATING CYLINDER SEAL.
½" RADIAL ROD MOVEMENT POSSIBLE.
HIGH CARBON, FLAME-HARDENED GUIDES.
BALL JOINT AT BOTH ENDS OF ROD.
NON-METALLIC WEAR RINGS.

STAMLER Hydraulic CAR SPOTTERS

Remember... STAMLER has built NOTHING BUT Car Spotters since 1949!

W. R. STAMLER CORP., PARIS, KENTUCKY

SCHROEDER BROS., Exclusive Eastern Sales Agent, Pittsburgh, Pennsylvania • UNION INDUSTRIAL CORP., Carlsbad, New Mexico
SALMON & CO., Birmingham, Alabama • WESTERN SALES ENGINEERING CO., Salt Lake City, Utah

Part of the conveyor belting network at Truax-Traer's Eunice Mine.

Why Truax-Traer uses neoprene conveyor belting

A total of seven miles of conveyor belting is in service at Truax-Traer Coal Company's four mines at Kayford, West Virginia.

Much of this belting is neoprene, chosen not only for its flame resistance, but because neoprene offers true long-term economy in mine service. It resists abrasion, cutting, chipping . . . insuring extra protection of the body fabric from load abrasion and deterioration by mine water and mildew. In addition, neoprene belt covers are resistant to aging and the softening effect of lubricants. And on the surface, neoprene's resistance to sunlight and weather also means longer belt life.

Next time you replace your conveyor belting or buy a new conveyor, be sure to specify neoprene. Its outstanding resistance to oil and grease, abrasion, aging and fire will save you money.

For information about neoprene, ask us for the Elastomers Notebook. Just write to E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. CO-12, Wilmington 98, Delaware.

DU PONT

REG. U. S. PAT. OFF.

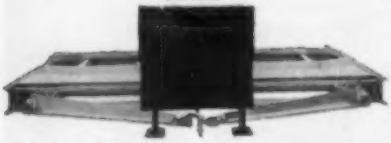
Better Things for Better Living
. . . through Chemistry

NEOPRENE
made by Du Pont
for 25 years

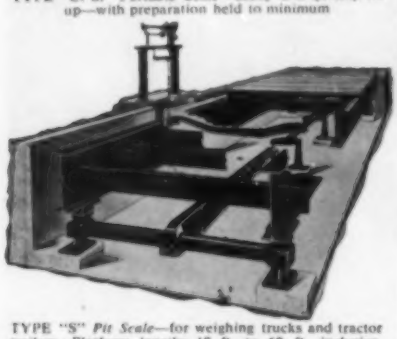
WINSLOW

Dependable — Accurate

TRUCK and TRACTOR TRAILER SCALES



TYPE "C. S." *Portable Scale*—easily and quickly set up—with preparation held to minimum



TYPE "S" *Pit Scale*—for weighing trucks and tractor trailers—Platform lengths 18 ft. to 60 ft. inclusive.

WINSLOW SCALE COMPANY

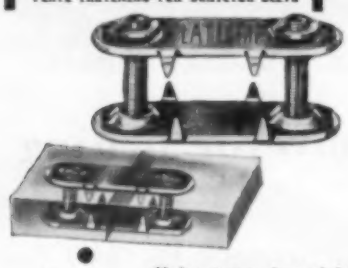
TERRE HAUTE 1, INDIANA

Phone for more details, North 6515

Scale Manufacturers since 1896

PLATEGRIP

PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. *Write for Catalog Sheet.*

ARMSTRONG BRAY & CO.

5340 Northwest Highway, CHICAGO 30, U. S. A.

Personal Notes *(Continued)*

Everett J. Decker, of Peterson & Packer Coal Co., Troy, N.Y., was awarded a plaque for his devoted services to the anthracite industry at a recent convention of the Fuel Merchants Association of New Jersey. The award cited Mr. Decker's outstanding contributions to the hard coal business, mentioning specifically his important role in establishing the industry's public relations program. He has just completed an active term as vice chairman of the Anthracite Industry Council and is now acting as special representative to the council from the Eastern States Retail Solid Fuel Conference.

Albert A. List, Dudley G. Layman and Major General Royal B. Lord, all of List Industries Corp., have been elected members of the board of directors of Glen Alden Corp., it was recently made known. List Industries recently acquired, pursuant to an offer for tenders, about 675,000 shares of Glen Alden stock, approximately 38% of all outstanding shares. Glen Alden is the world's largest operator of anthracite coal mines. The newly elected directors increase Glen Alden's board from six members to nine. Mr. List, a prominent financial figure, has been associated over the years as chief executive of a number of large diversified companies.

Harry B. Gloss became purchasing agent for Boone County Coal Corp. Mr. Gloss joined the company in September, following 17 yr of employment in the purchasing, accounting and engineering departments of U.S. Steel Corp. at Gary, W. Va. Mr. Gloss is a graduate of Salem College, Salem, W. Va. and resides in Sharples, W. Va. with his wife and son.

Cyrus Eaton was chosen one of the nation's "Fifty Foremost Business Leaders" for his achievements in iron ore, steel, coal, transportation, banking, farming philanthropy and international relations. Mr. Eaton began his career at an early age with John D. Rockefeller, Sr. He has figured in two spectacular iron ore developments, at Steep Rock Lake, in Ontario, and more recently at Ungava Bay, in far northern Quebec. In addition to being head of Chesapeake & Ohio Ry., Mr. Eaton is board chairman of Steep Rock Iron Mines Limited of Canada and West Kentucky Coal Co.

Clinton C. Cornelius, vice president—operations, Baton coal interests of Pennsylvania, was chosen for the position of general manager, U.S. Fuel Co., Salt Lake City, Utah. U.S. Fuel is a subsidiary of U.S. Smelting Refining & Mining Co.

The SIMPLE LOW COST WAY to RECOVER COARSE COAL FINES

with

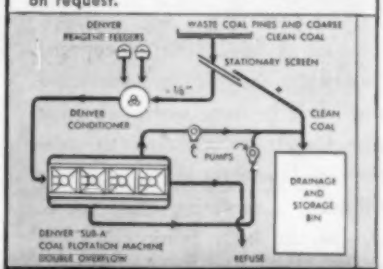
DENVER "Sub-A" COAL FLOTATION

HANDLES 1/8" FEED

With Denver "Sub-A" Flotation machines you can handle 1/8" feed. Ability to float coarse fines eliminates costly intermediate treatment steps, aids fine coal dewatering and water reclamation, simplifies construction of fine coal recovery systems.

Although coal particles as coarse as 1/8" may not always be completely recovered by the flotation process (which is most effective with minus 28 mesh coal), you will recognize the advantage in simplification provided by handling all of the undersize from coal cleaning and recovering all floatable coal in one low in ash product.

Over 95% of all coal flotation plants in the U. S. use Denver "Sub-A". Why not follow their lead? Case histories on request.



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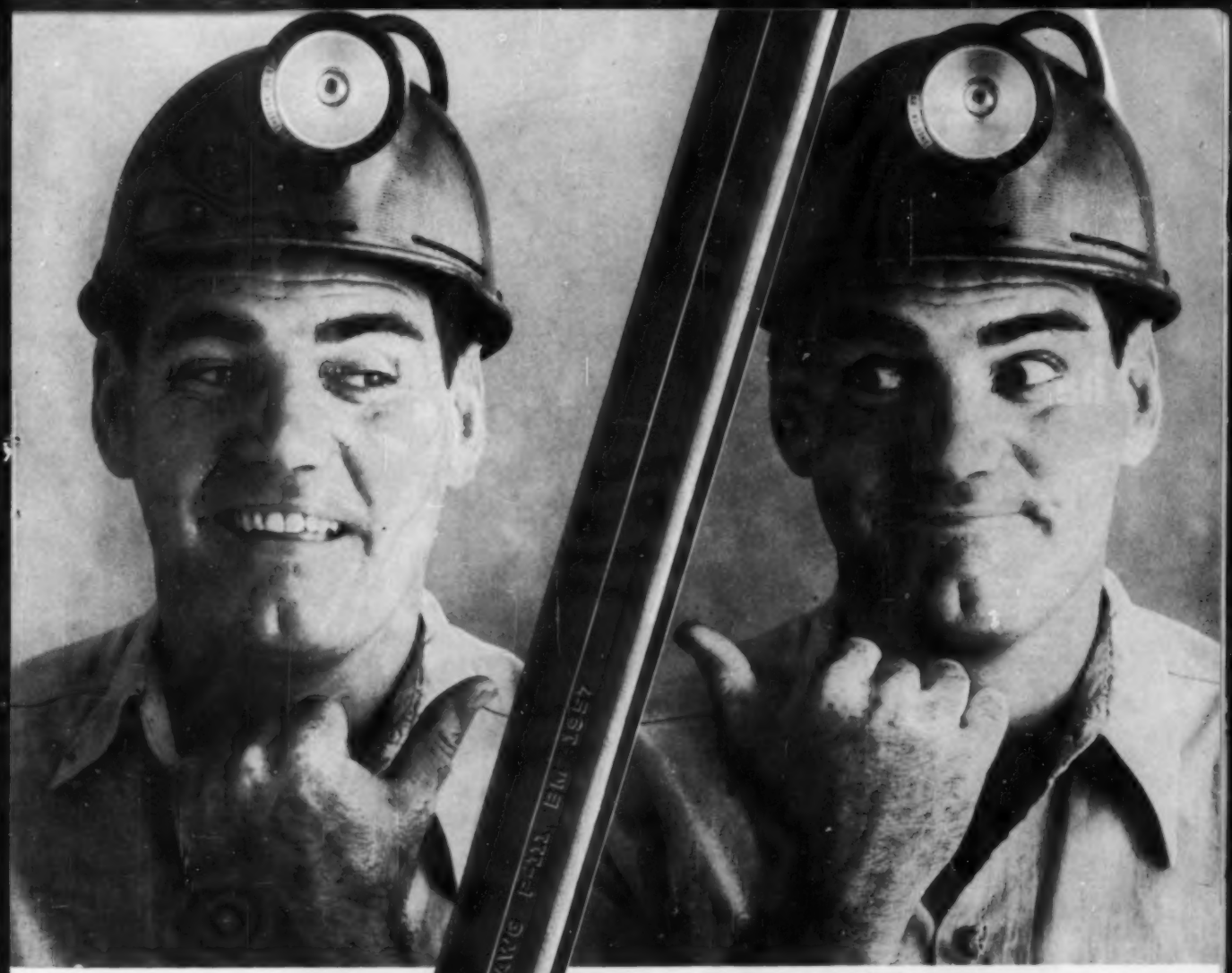

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ROEPRENE Mining Cables are approved by the Pennsylvania Bureau of Mines. Approval P-111, and comply with the requirements of the U. S. Bureau of Mines for flame resistance. Roeprene Parallel Trailing Cables are also available as Type "W" without ground wire.

Rugged sheath on Roeprene® Parallel Twin Mining Machine Cable won't "sleeve." Unique ground wire is formed by braiding, for longest life.

See how sheath surrounds and grips conductor insulation! This prevents "sleeving"—waves and wrinkles don't form in outer sheath. Conductors are locked fast, can't slip.

And look at Roebling's grounding conductor. It's braided and eased into shape from fine annealed copper wire, not made of bunched wire forced into shape by flattening rolls. A braided green cotton covering strips clean to make splicing and terminating easy, and permits ground conductor to move within sleeve when cable is flexed. Result—power conductors absorb tensile load.

There are other features, too! Heat- and moisture-resistant GR-S insulation around power conductors . . . a sheath of tough, oil- and moisture-resistant, flame-retardant Roeprene . . . and a combination of properties—including finer wires in power conductor—which mean extra flexibility, permitting a smaller bending radius.

Write or call Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, for more reasons why Roeprene Parallel Twin Mining Cable is the most economical cable you can buy!

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The latest addition to Leman Machine Co.'s repair facilities is this horizontal boring machine —permitting the finest machine tool precision on even the largest mining machinery. Now, more than ever, Leman equipment is as good or better than that of many equipment manufacturers. It will pay you to investigate the high quality repair work you get from Leman on anything from continuous mining machines to electric locomotives. Old equipment is restored to original condition—conversion to latest models is made—new parts are designed for special jobs. You'll save at Leman, where repair time is less and worn or damaged equipment is made "good-as-new."

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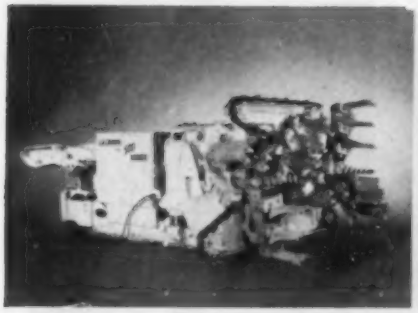
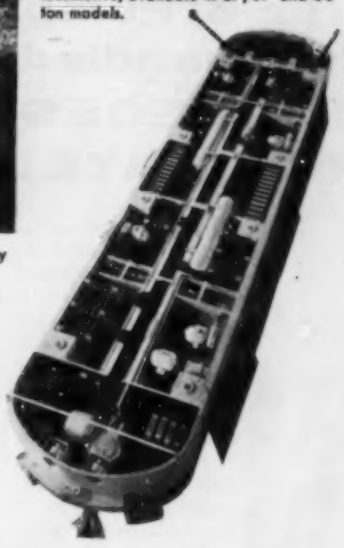


Goodman type 500 continuous mining machine that cuts and loads up to seven tons per minute from solid, unprepared seam.

Joy 10 — SC Shuttle Car — a rugged heavy-duty unit for dependable haulage in thick seams.



Jeffrey eight wheel, four motor trolley locomotive, available in 27, 37 and 50 ton models.

Leading Mine Equipment Manufacturers Specify

ROCKBESTOS A.V.C.

Mining Cable

for Wired-in dependability
Greater productivity
Lower wire maintenance cost
Less equipment down time

For years such leading manufacturers of mining equipment as Jeffrey, Goodman, and Joy have turned to Rockbestos A.V.C. Mining Cable for wiring in motors, in controllers, between controllers and resistors and in headlights. This Rockbestos A.V.C. Mining Cable helps assure dependable service for their customers, helps keep equipment maintenance down, production time up.

Continuous miners, loaders, cutters, shuttle cars, locomotives and other mining machinery operate more efficiently, need less wire maintenance thanks to Rockbestos A.V.C. Mining Cable — the wire that's designed specially for mining equipment use.

Built to stand up and give trouble-free performance, Rockbestos A.V.C. will not ignite or carry flame . . . remains flexible . . . won't dry out or crack . . . safely takes heating overloads . . . won't bloom or rot when exposed to grease and oil . . . fits bushings right.

When buying new mining equipment, or servicing old . . . be sure . . . *specify and insist on Rockbestos A.V.C. Mining Cable.*

ORDER FROM THESE JOBBERS — SPECIFY "ROCKBESTOS A.V.C."

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COWEN, W. VA.
Pennsylvania & W. Virginia Supply Corp.
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Pennsylvania & W. Virginia Supply Corp.
EVANSVILLE, IND
Evansville Electric & Manufacturing Co.
FAIRMONT, W. VA.
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Westmoreland Hardware Co.
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Banks-Miller Supply Co.
INDIANA, PA.
National Mine Service Co.
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National Mine Service Co.
LOGAN, W. VA.
National Mine Service Co.
LOTHAIR, KY.
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McCLURE, VA.
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The 6" Pump that handled 10" PIECES OF SLATE!

When the operators of a West Virginia mine installed this 6" Wemco Solids Pump, they put it to work handling 2½ x 0 Chance Cone Reject, pumping 500 GPM at 25' TDH. It not only proved to be the most efficient coal-handling device they had ever seen, but it also consistently passed pieces of slate as large as 4" x 10" and occasional tramp iron and other debris — *without stopping!*

The Wemco torque-flow Solids Pump works on the unique principle of a "can't-clog" *liquid impeller.* Write for complete details on this amazing new pump, now in use by dozens of mines, cleaning plants, preparation plants, and other coal operations.

WEMCO

TORQUE-FLOW SOLIDS PUMP

WESTERN MACHINERY COMPANY

650 FIFTH STREET, SAN FRANCISCO 7, CALIF.

Personal Notes *(Continued)*

Mr. Cornelius is a graduate mining engineer from Pennsylvania State University. He served in World War II.

J. S. Whittaker was selected as vice president of Pittsburgh Coal Co., a division of Pittsburgh Consolidation Coal Co. Mr. Whittaker was director of safety and served as general superintendent for the company until his new appointment. At the same time, it was announced by Pittsburgh Coal Co. that **J. R. Palin** would become assistant chief engineer.

Thomas Robins, 89, founder and former chairman of Hewitt-Robins, Inc., and inventor of the heavy-duty belt conveyor now used extensively to transport coal, ore and other bulk materials, died in a hospital recently after an illness of several months. Mr. Robins, born in Highland Falls, N. Y., in 1868, conceived the idea for the modern belt conveyor in 1891 and made his first sale to Thomas Edison's iron ore mine in northern New Jersey.

New Books

ASTM Standards

ASTM Standards on Coal and Coke is a compilation of the numerous ASTM methods of testing, definitions, and specifications for coal and coke, and the standard specifications for the classification of coal according to rank and grades. The edition contains 21 methods of testing, 4 specifications and 3 definitions. *140 pp. 6x9-in; paper. $2.50, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.*

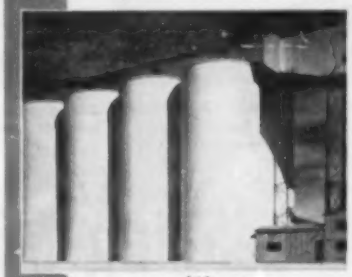
Arc Welding

New Lessons in Art Welding, second edition, has been completely rewritten and revised to include new procedures, information on latest machines and electrodes, and modern teaching methods for manual arc welding. *320 pp. 6x9-in; simulated leather. $1, U. S. A., $1.50 elsewhere, The Lincoln Electric Co., Cleveland, Ohio.*

Fire-Fighting Equipment

Survey of Fire-Fighting Facilities at Coal Mines, by R. W. Stahl and C. H. Dodge. This report describes fire-fighting facilities at 11 representative mines in the United States. Noteworthy practices as well as flaws are listed. Many suggestions for improving fire protection are included along with illustrations showing fire-fighting facilities at the 11 mines in the survey. *R. I. 5363, Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.*

STOP material waste
REDUCE handling costs
IMPROVE product quality



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Why put up with costly, inefficient coal storage and handling?

Let Marietta design and erect an efficient and economical storage system for your needs. Marietta concrete silos are quickly constructed without weather or material delays. Precast solid or lightweight air-cell concrete staves interlock to form an air-tight wall that keeps material stored fresh and dry . . . safe from weather or fire damage.

Marietta concrete silos provide years of service with minimum maintenance . . . save money through reduced insurance costs.

Any type of mechanical or pneumatic conveyors, feeders or discharge systems can be safely mounted on top or on the sidewalls of Marietta silos. Consult with Marietta now for the best answer to your particular storage problems . . . benefit by their more than 40 years "Know-how" in precast concrete and industrial storage systems.

Write now for a copy of the Marietta Industrial Storage Systems Booklet. Full cooperation extended to your own engineering staff, consultants and contractors.

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It's the "give" in the Yieldable Arch that does it

Where conditions underground are unstable, no rigid type of roof support however strong, can long withstand these dynamic forces. Often, the more rigid the support, the more it may aggravate the situation.

Bethlehem Yieldable Arch utilizes the old technique of letting the enemy beat himself. By gradually yielding, or "giving," under the excessive pressures, the Arch gives the overburden a chance to settle into a natural arch of its own, and thus bring forces into equilibrium. As long as the pressures are excessive, the Arch will continue to "give"; as soon as stability is reached, the Arch holds the line.

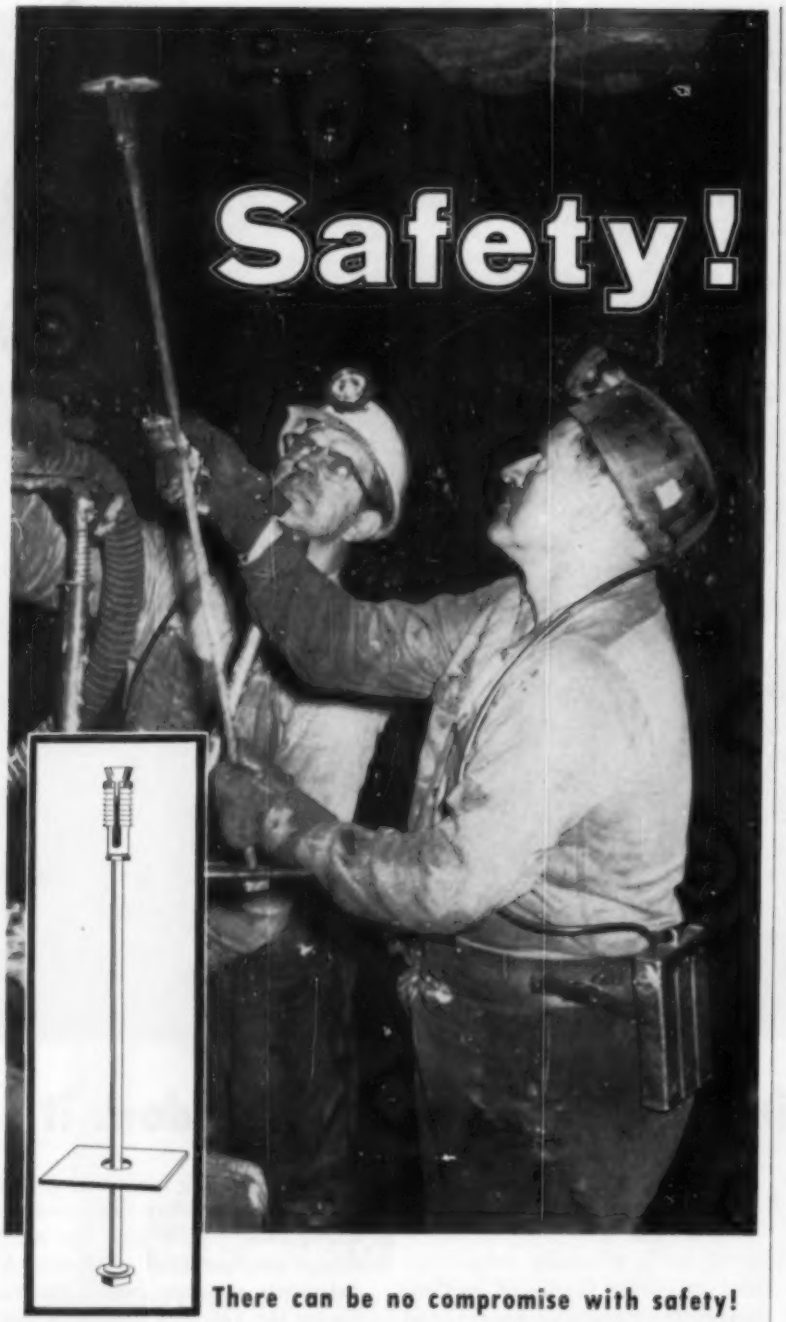
A set of Yieldable Arches consists of curved U-shaped sections nested together and overlapped enough to permit clamping with husky U-bolt clamps. The clamps control the degree of tightness of the joint, and permit yielding when the forces exceed the load for which the joint was intended. Each Arch set is tied to adjoining sets by means of horizontal struts, which add lateral rigidity to the structure.

Besides increasing mine safety, the Yieldable Arch offers high salvageability, and usually pays for itself within its first year of service. A Bethlehem engineer would like to discuss the Yieldable Arch with you —in terms of your own roof problems. You can reach him through the nearest Bethlehem Sales Office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL



There can be no compromise with safety!

West Virginia Mine Roof Bolts

assure you of the ultimate in safety plus economy and ease of installation.

Qualified and experienced Engineering Service yours for the asking. Contact West Virginia Works, Connors Steel Division, H. K. Porter Company, Inc., Huntington, W.Va.

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CONNORS STEEL DIVISION

Foreign News

FRANCE

Rising Coal Prices

Coal prices in France are expected to rise after the government's recent decision to spread the 20% import tax to all imports. The tax hit most imports last August after partial devaluation of the franc. Only oil and a few other essential materials were exempt until now. France imported 20 million tons of coal last year, including 7 million tons from the United States. These 7 million tons, and imports from other countries, were subsidized by the government to keep down the price at the artifically low French coal rates. In 1956, subsidizing foreign coal imports cost the government over $85 million. This subsidy would have to be doubled if the government were to absorb the new 20% tax; for this reason, most industry observers think the government will pass the tax on to the consumer and let him pay 20% more for the imported coal he needs.

PERU

First Coal Shipment

The first shipment of 10,000 tons of Peruvian coal left the steel and coal center at Chimbote, north of Callao, recently, bound for a French port. This shipment is the first consignment of an order for 180,000 tons of Peruvian coal to be shipped over a period of 18 mo to a French firm, owned by Charles Schneider, prominent industrialist; it opened for the first time, a European market for this Peruvian product.

At a press conference, Mr. Schneider stated that, barring unforeseen circumstances, this preliminary order, within less than a year, would be increased to 500,000 tons per annum and that negotiations were underway for signing a 7-yr agreement for shipment of like amounts. Presumably, that agreement is dependent mainly on increasing the productive capacity at the mines, railway, and handling facilities at the port, in connection with which representatives of the Schneider firms are now negotiating with mine owners.

POLAND

Reduced Export Prices

Sources say that the coal market of Sweden has turned into a 'buyer's market' as far as the Poles are concerned. Recent Warsaw reports indicate that Poland had to reduce coal prices in export to Sweden by between 20 and 25% in order to sell enough Polish coal to

balance the wanted quantities of Swedish iron ore in return. An indignant Warsaw statement says that western, especially United States, hard coal shipments to Sweden, have 'ruined' the Polish market. Poland, which reduced almost all other western-directed coal shipments for the current and the next year, were unhappy at Sweden's limiting coal exports from Poland to 200,000 metric tons, during Oct 1, 1957 to April 3, 1958 period.

GERMANY

Experimental Plant

An experimental plant for iron-coke production, reportedly handling 500 tons of coal per day, has been put into operation in Walsum, Germany, in the Ruhr area. It is being used to produce iron-coke from a mixture of long-flame gas coal and fine iron ore. The process, patented by Bergwerksgesellschaft Walsum Co., makes it possible for the first time to produce blast furnace coke out of long-flame gas coal without using low-volatile coal or high-volatile coal, according to the firm.

The process involves the grinding and mixing of long-flame gas coal with fine Swedish ore and 2-3% oil. Then the mixture is processed in a coking plant into so-called iron coke, which is reported to have particular strength and good smelting qualities. Additional savings in scrap iron compared to the normally required furnace charge achieved, due to the iron content of the iron-coke.

RHODESIA

Power Demands Fall

Construction work on the Kariba hydro-electric scheme is progressing rapidly and there are prospects that power will be available from this source in 1960. Main worry now is the impact of Kariba on coal demands of the Federation of Northern Rhodesia. Coal was discovered in the Wankie Valley in 1894, and in 1899 the Wankie (Rhodesia) Coal Ry. & Exploration Co. was formed. Coal from the Wankie Colliery has been the core of development for Rhodesia because oil and natural gas have never been discovered there.

It is expected that the effect of Kariba on demands for coal will be two-fold. First, it will reduce the demand for power station coal in both northern and southern Rhodesia, and secondly, the loss of power station coal traffic on the railways will reduce consumption of locomotive coal. It is hoped that future industrial and mining activities, stimulated as they must be by abundant supplies of cheap hydro-electric power, will call for increasing supplies of coal for a variety of purposes, and thus compensate for the reduction in thermal power station de-

If you convey this . . .

you need this . . .

QUAKER CONVEYOR BELTING FOR SAFETY AND STAMINA!

Quaker Rubber's fire-resistant, flame-retarding belt actually *exceeds* the U. S. Bureau of Mines essential standards for underground mine safety.

The specified flame test permits burning up to 1 minute. But when the test is made on Quaker's belt, the flame is extinguished *instantly*. What's more, afterglow disappears in about one-third the time required by Bureau standards.

This belt is also lightweight and highly flexible. It has good troughability, yet is tough enough to take shock impacts and heavy, jagged loads. Made in any length. Widths up to 72".

Next time, specify "Fire Resistant U.S.B.M. 28-11" from your Quaker Rubber or Quaker Pioneer Rubber distributor. You'll like the savings . . . and the service.

For more information, write to:
H. K. Porter Company, Inc., Quaker Rubber Division, Philadelphia 24, Pennsylvania, or Quaker Pioneer Works, Pittsburg, California.

H. K. PORTER COMPANY, INC.
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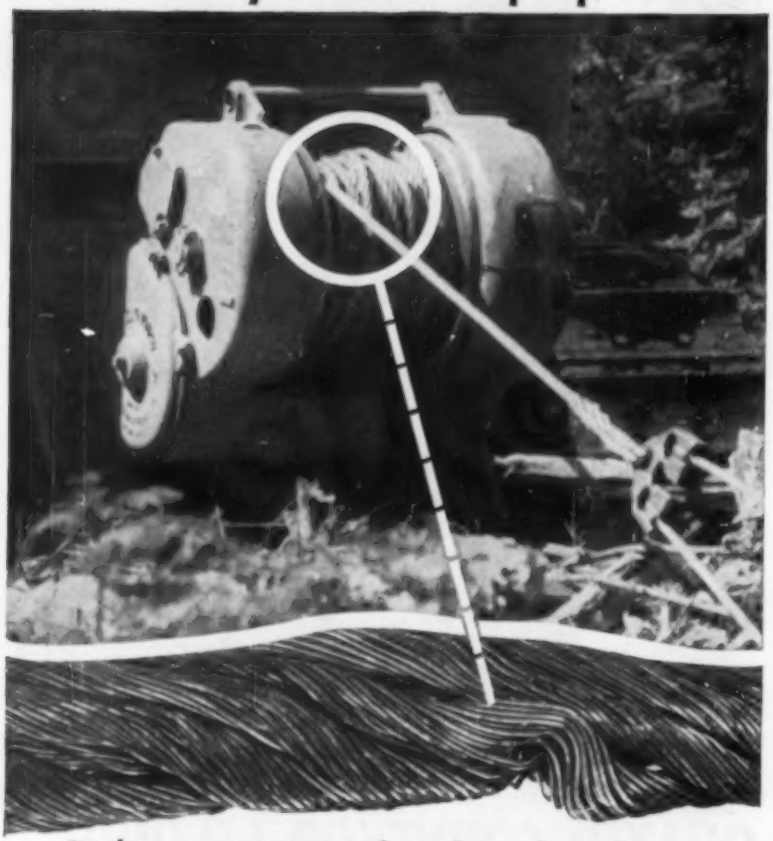
crushing...

is this your wire rope problem?



Right construction for the job reduces downtime...cuts wire rope costs!

SEND FOR LESCHEN "*RED-STRAND*" BULLETIN NO. 102

Once wire rope is crushed or pinched out of shape on sheaves or drums, useful life is drastically shortened. More often than not, this loss can be prevented. Minor changes in equipment, adequate inspection or using the most suitable rope construction may eliminate the difficulty entirely. These and other solutions are clearly explained in Bulletin No. 102 which is yours for the asking. By all means write for your copy today. Feel free, too, to ask for solutions of any other wire rope problems you'd like to have solved. The full resources of our engineering staff and field organization are at your service. Address: Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Missouri.

LESCHEN Red-Strand WIRE ROPE

H. K. PORTER COMPANY, INC.

LESCHEN WIRE ROPE DIVISION

Foreign News *(Continued)*

mand. Also, attention is being given to the possibilities of producing oil from coal.

USSR

Satellite Coal Reserves

Russia's satellites sent representatives to a meeting for the evaluation of coal potentialities throughout the Red block area, and to draft plans for the coming year. It was revealed that coal output lags in all countries of the block with the exception of the USSR and Albania. However, every country except Austria was able to report increases in production.

The meeting, which produced only silence on the current year's actual output and inter-block exchange, did show a better outlook for black and brown coal.

BULGARIA

Self-Sufficiency

Bulgaria, subject to forced industrialization since 1945's start of Soviet domination, is now at the point of near self-sufficiency. After investing some $29,410,000 during the 1949 to 1957 period, production capacity has been increased from 5,600,000 tons in 1949 to 10,300,000 metric tons in 1956. The 1957 plan, in calling for 11,000,000 metric tons of coal produced, is said to be fulfilled if the mines average an 80% rate of capacity of utilization.

U.S. Bituminous Output

YEAR TO DATE	PRODUCTION
November 16, 1957	434,551,000
November 17, 1956	441,174,000

1957 output 1.5% behind 1956.

A month earlier output was 0.8% behind 1956.

WEEK ENDING	PRODUCTION
November 16, 1957	9,120,000
November 17, 1956	10,327,000

U.S. Anthracite Output

YEAR TO DATE	PRODUCTION
November 16, 1957	22,586,000
November 17, 1956	25,478,000

1957 output 11.4% behind 1956.

A month earlier 1957 was 9.3% behind 1956.

WEEK ENDING	PRODUCTION
November 16, 1957	446,000
November 17, 1956	647,000

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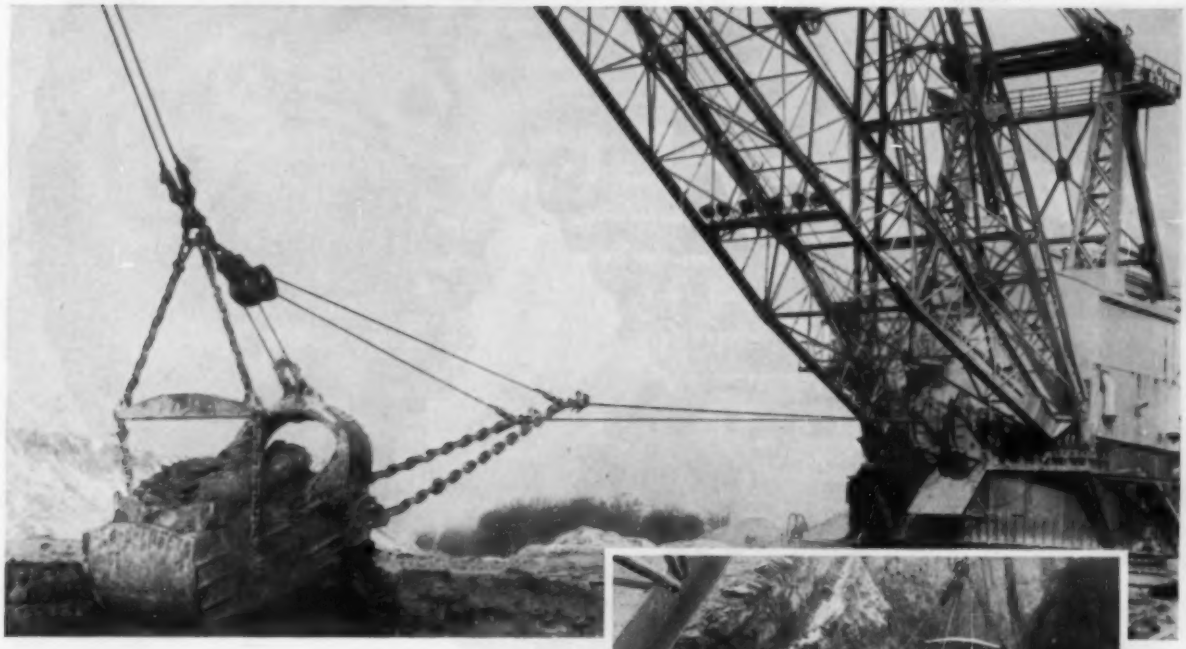
... ANGUS BAIN
FAIRVIEW COLLIERIES,
DANVILLE, ILLINOIS



30 yd. Page Automatic digging to depths up to 100 ft. gets maximum loads each cycle.

There's No Substitute for DIGGING ABILITY In a Dragline Bucket

Experienced dragline men like Angus Bain of Danville's big Fairview Collieries, know that the only way to judge a dragline bucket is by its *digging ability*. Digging ability means faster loading of maximum loads, more cycles per hour and greater production per shift – the real payoff of dragline equipment.

Page Automatic Buckets lead the field and are the choice of production-conscious buyers because they have the built-in automatic action that makes them start digging sooner, fill faster and carry out more yardage than any other bucket.

Page Automatic Buckets have often been imitated, but their most important feature – *digging ability* – has never been equalled. You can improve the productive capacity of any machine by putting it to work with a Page Automatic ... the bucket that's built to dig better.

Want proof? We can arrange a demonstration of a Page Automatic on your own machine. You be the judge of its digging ability and performance. Write for details today. There's no obligation.

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Automatic Dragline Buckets
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If it's a PAGE... *It* DIGS

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NO REBORING—
NO KEYSEATING—
NO MACHINING—
NO WAITING!

TAPER-LOCK SPROCKETS
SINGLE AND DOUBLE STRAND!

NOW Taper-Lock *Double* Strand Sprockets are available—from stock—ready for the shaft without re-machining!

They offer all the advantages of Taper-Lock mounting. Easy on! Easy off! Precision machined at the factory, they come to you with accurate, concentric bores—insuring full contact between hub and shaft. Taper-Lock grips with the firmness of a shrunk-on fit!

There is no flange, no collar, no protruding part. Flush design means *safety*... If the sprocket becomes worn, you replace only the tooth part. The bushing is used again and again. And Taper-Lock bushings are interchangeable in Dodge Taper-Lock Sheaves, Couplings and Conveyor Pulleys!

Taper-Lock Sprockets and Dodge Roller Chain (made to ASA standards) are stocked by Dodge distributors. Single Strand sizes range from No. 40 to No. 160, up to 112 teeth; Double Strand from No. 40-2 to 80-2, up to 102 teeth. Write for Bulletin A-644 containing selection, installation and maintenance data.

DODGE MANUFACTURING CORPORATION
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of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.

TAPER-LOCK CHAIN COUPLINGS

Accommodates common minor shaft misalignments. Provides strong, compact coupling. Available with covers, for appearance, safety, dirt protection and lubrication—which increases coupling life.

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There's a new, effective way to aid your public relations in communities where you are blasting. It's the interesting, informative sound film, in color, entitled, "*We're Blasting Near You.*"

When you show this film to PTA meetings, service clubs and other civic organizations, you can prove that you're a good neighbor . . . that blasting, while necessary, is nothing for people to be alarmed about.

"*We're Blasting Near You*" shows how modern millisecond delay techniques eliminate old-fashioned, jarring explosions . . . how modern methods hold blasting noise to a muffled minimum, and make vibration unnoticeable. In a friendly, non-commercial way, the movie shows your efforts to be a good citizen in the community.

You can show this movie to any age group. It is accompanied by a kit containing news releases, sample speeches, safety posters and other helpful material which will make your public relations meeting a success. Write for available dates, and show "*We're Blasting Near You*" in your community!

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WILMINGTON 99, DELAWARE

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Current Coal Patents

By Oliver S. North

Scraper conveyor having haulage drums for winding cables of coal planer, J. J. Zeegers (assigned to Stamicarbon N. V. Heerlen, Netherlands), Oct. 22, 1957. Scraper conveyor for installation along a working face utilizes driving drums as source of power. No. 2,810,564.

Drives for automatic mining machines of the planer type, G. Dommann, Oct. 22, 1957. Improved drive system for planer miner. Separate drives are provided for conveyor and planer. Direct drive is used for conveyor; indirect drive for planer. This apparatus permits manual preparatory work in fault zones and installation of additional roof support where needed. No. 2,810,565.

Shield and feed control for mining machine of the screw auger type, R. A. Parsons (assigned to United States Steel Corp., a corporation of N. J.), Oct. 22, 1957. Shield for protecting screw of auger mining machine against overload, such as when strata movement occurs. Shield normally is stationary, but optionally can rotate with the screw to allow controlled removal of material that otherwise would foul the screw. No. 2,810,566.

Cutter tool assembly providing a floating fit between tool and holder, F. L. Kirkham (assigned to General Electric Co., a corporation of N. Y.), Oct. 22, 1957. Cutter tool assembly designed to facilitate removal and replacement of cutter bits by the utilization of magnetic means to maintain cutter bit in place. This assembly is especially useful with continuous coal mining machinery, where cutter bit changes are relatively frequent and often made under dificult conditions. No. 2,810,567.

Mining chain cutter, H. Fritzsche (assigned to VEB Braunkohlenwerke Domsdorf, Domsdorf, Germany), Oct. 22, 1957. Wear-resistant cutting chain for mining machine. Draw and shear forces are taken up without affecting life of the chain. Ingress of dust into spaces between chain elements is minimized, and lubricant loss also is lessened. No. 2,810,568.

Mobile roof drill, J. R. Fletcher and W. F. Fletcher (assigned to J. H. Fletcher & Co., Chicago, Ill.), Oct. 29, 1957. Improved drill for drilling bolt holes in mine roofs. Drilling carriage is supported for vertical movement against a drop mast reacting against the mine floor. No. 2,811,335.

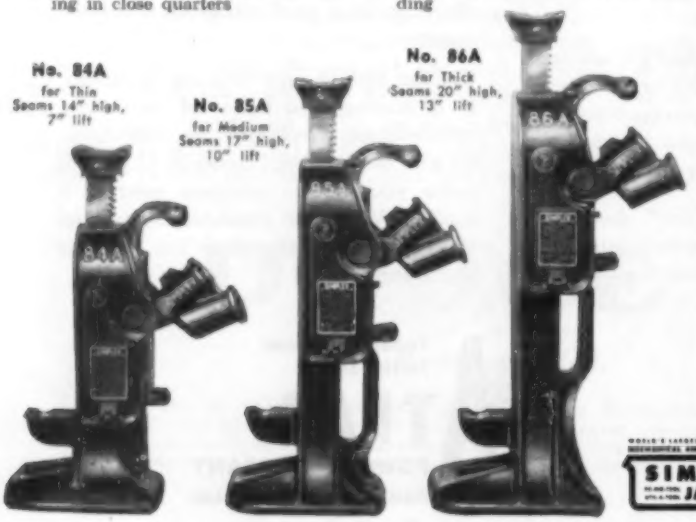
Tunneling machine rotary head having shearing blades on oppositely rotating head portions, J. S. Robbins (assigned to Goodman Mfg. Co., Chicago, Ill.), Oct. 29, 1957. Improved means for cutting away rock or other material where the proximate ends of the cutter arms pass each other while rotating in opposite directions. No. 2,811,341.

Cutter bar, R. A. McCallum (assigned to Goodman Mfg. Co., Chicago, Ill.), Oct. 29, 1957. Improved cutter bar for kerf-cutting machine having a tip for reversing the runs of the cutter chain trained therearound. The tip is able to transmit forces acting thereon to the upper and lower frame members of the cutter bar. No. 2,811,342.

SIMPLEX MINE JACKS

6 WAYS BETTER

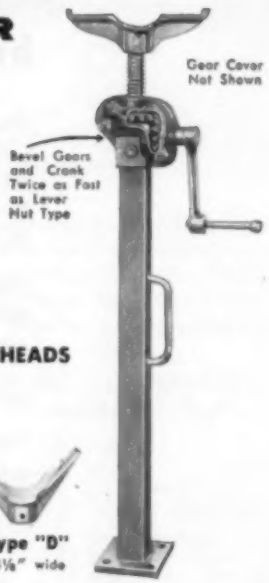
★ Ratchet lowering lever type for speed with safety
★ 5-tons capacity (other models to 35 tons)
★ Double-lever sockets permit lifting in close quarters
★ Full capacity on cap *OR* *GROOVED* toe
★ Safety Speed Trigger
★ Ideal for re-railing, repairs, skidding



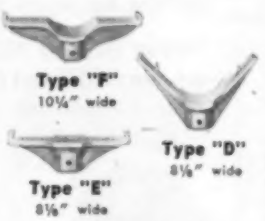
Hi-Speed TIMBER JACK

MODEL NO. 642
LIFTS 6 TONS

Combines safety of screw jack with fast action of crank. Head swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".



3 TYPES OF HEADS



Write for Mines Bulletin for data on the most complete line of Mine Jacks

TEMPLETON, KENLY & COMPANY
WORLD'S LARGEST MFGRS. OF INDUSTRIAL MECHANICAL AND HYDRAULIC JACKS
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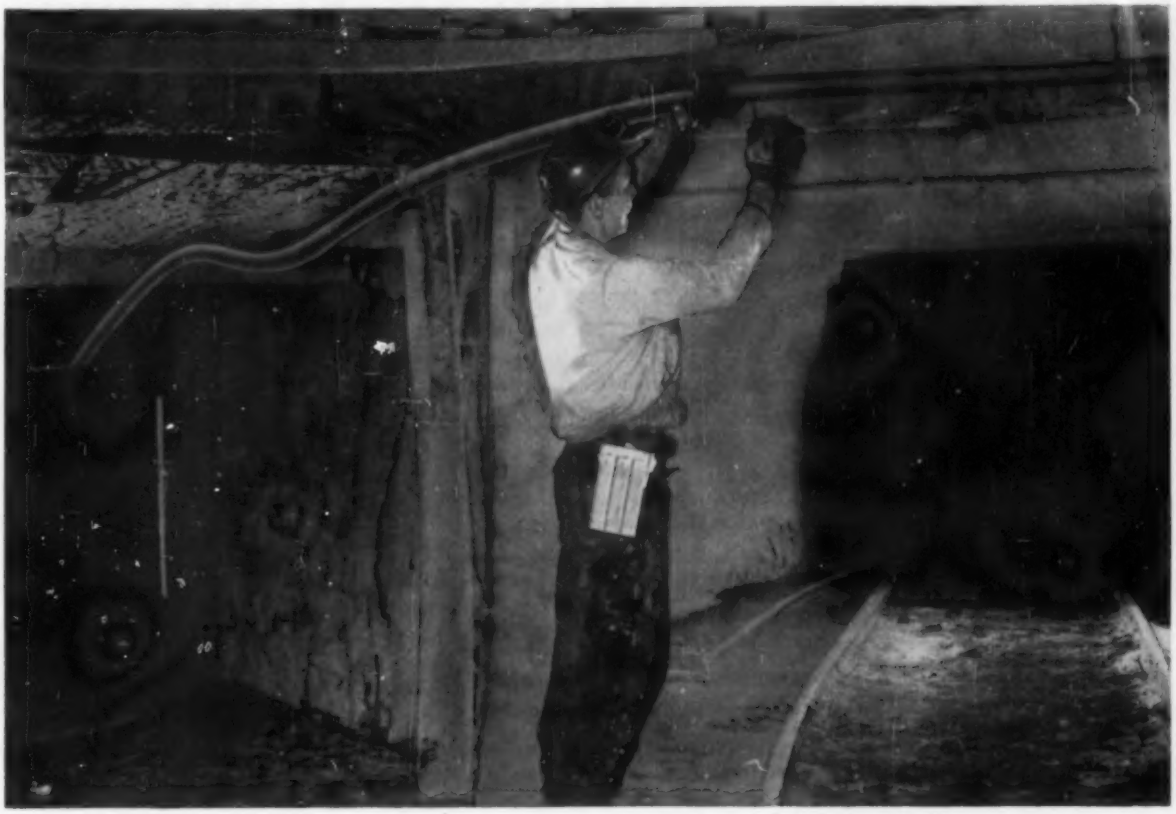


Is mine atmosphere eating the service life out of your equipment?

ALTHOUGH the corrosive atmosphere of a coal mine is "murder" on mine equipment, National Tube has come up with the solution for trouble-free mine drainage pipe. It's USS NATIONAL* Polyethylene Pipe. Deadly corrosive mine water has no effect on it. Acids, alkalis, salts, and most chemicals are helpless against NATIONAL Polyethylene Pipe.

Although light, flexible, and easy to install, Polyethylene Pipe is tough. It takes rough handling without cracking, even at sub-zero temperatures, down to -90°F., and up to +120°F.

Once you start using NATIONAL Polyethyiene Pipe, you'll not only stop laying out money for replacement drainage pipe, but you'll actually save money, since Polyethylene Pipe is the *most economical pipe* that can be effectively used for mine drainage.

Available in sizes from ½-inch to 6 inches in diameter, and in a variety of wall thicknesses, NATIONAL Polyethylene Pipe is manufactured from virgin "on grade" polyethylene raw material. For complete information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

This seal of the National Sanitation Foundation means Tested . . Approved . . Sanitary!

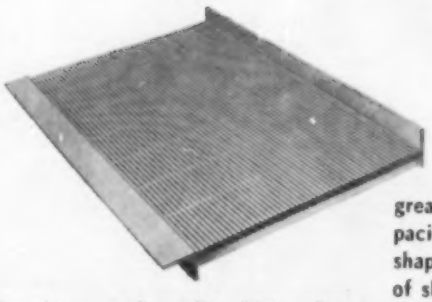
NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH 30, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS *TRADEMARK

NATIONAL **Polyethylene** PIPE

UNITED STATES STEEL

GIVES COAL A REAL CLEAN SCREEN!



You keep coal quality high when you give it a Hendrick Wedge Slot screening! Hendrick Wedge Slot has the kind of small openings that assure fine screening yet affords far greater draining and screening capacity. Profile bars are "precision shaped" to maintain uniform width of slot openings the entire length of the screen as wear progresses. For details on the Hendrick Wedge Slot Screen best suited to afford long life under your specific operating conditions, write Hendrick today.

Hendrick MANUFACTURING COMPANY
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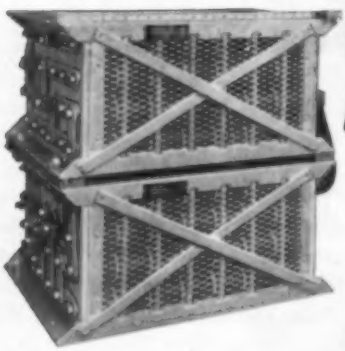


What do YOU need in a Locomotive Resistor?

GUYAN offers you these advantages:

PROTECTION—for your motor and controllers, LONG SERVICE LIFE—without warping and buckling; SMOOTH STARTING—without dangerous jumps between points; HARD SERVICE REQUIREMENTS—engineered and designed for your locomotive and mine conditions; ECONOMICAL PRICE—low first cost and maintenance freedom.

GUYAN Locomotive Resistors are recognized in the mining industry for their ruggedness and dependability. They are built to withstand rough usage in locomotives and moving machinery where excessive vibration and shock make the more fragile grid types undesirable. *Write for details.*

GUYAN MACHINERY CO.
LOGAN, W. VA.

Guyan RESISTORS

Patents *(Continued)*

Heavy duty cutter bit for boring type miner, C. H. Brown (assigned to Goodman Mfg. Co., Chicago, Ill.), Oct. 29, 1957. Heavy duty cutter bit and support structure adapted to take the forces acting against the cutter bit holder. No. 2,811,343.

Lignite fuel, H. G. Lykken, Oct. 29, 1957. Method of producing a high quality pelleted fuel from lignite. Crushed lignite is mixed with a hydrocarbon oil and heated to 500-750F in the presence of superheated steam and oil vapors. Simultaneous tumbling produces pellets of oil-impregnated lignite that are hard, clean, dense, dust-free and moisture-resistant, and have a high net heat value. No. 2,811,427.

Four wheel steering for mine tractors, J. L. Kersey, Jr., and F. H. Kersey, Nov. 5, 1957. Improved battery-powered, rubber-tired mine tractor having four traction wheels which pull, steer, and brake to make the tractor particularly suitable for hauling mine cars in trackless coal mines. No. 2,812,191.

Process for preparing a liquid oxygen explosive, S. W. Martin (assigned to Great Lakes Carbon Corp., New York, N.Y.), Nov. 5, 1957. Process for producing a liquid oxygen explosive by adsorbing liquid oxygen onto a carbon base prepared by expanding a finely divided swelling bituminous coal at a temperature above 800C No. 2,812,246.

Extensible conveyor, H. J. Yaggi (assigned to Joy Mfg. Co., Pittsburgh, Pa.), Nov. 12, 1957. Improvements in the belt take-up control of a portable extensible conveyor. Take-up is automatically connected for operation whenever the take-up buggy drive motors are connected to move the take-up buggy towards the drive buggy. No. 2,812,848.

Earnings Reported

West Kentucky Coal Co. reports a slight increase in net income for the third period of 1957, when a net income was figured at $342,601 as compared with $280,372 for the same period of 1956.

Philadelphia & Reading Corp. reports a 6% increase in sales for the first 9-mo period of 1957, and a 58% increase in pre-tax profits for the same period. Net sales amounted to $63,115,025 as against $59,414,069 representing an increase of $3,467,243 or 58% above the comparable period of last year.

NEW RESULTS OF MONSANTO RESEARCH IN USE OF AMMONIUM NITRATE AS AN EXPLOSIVE

Typical shot with Monsanto's new kind of prilled NH_4NO_3

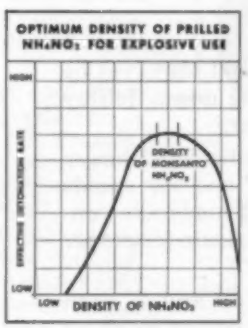
View of area involved in the blast. Shot was made in heavy columnar basalt at dam site. Used as an explosive: a new, top-quality, prilled NH_4NO_3 that Monsanto research developed to give you optimum savings, safety, speed and ease of handling.

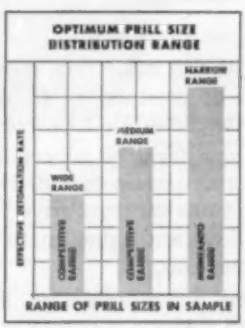
View at time of detonation. The system of detonation recommended by Monsanto, in conjunction with Monsanto Ammonium Nitrate, will yield equivalent pound-for-pound results with 60% gelatin dynamite at one-fourth the cost.

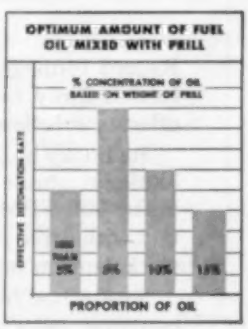
Results of blast. The powder factor in the shot above was 0.4 lbs. per cubic yard. Breakage of rock was considered ideal by contractor. Monsanto's experienced staff can give you complete technical service. Just phone Monsanto.

Photos courtesy of MORRISON-KNUDSEN COMPANY, INC.

Monsanto Ammonium Nitrate is now produced according to the specifications determined by these findings of Monsanto research. Result: more effective blast at greater savings. Monsanto is the world's largest manufacturer of prilled ammonium nitrate—and leader in developing the use of NH_4NO_3 as an explosive for open work. Request report presenting latest research findings.



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Construction Plans

Rockbestos Products Corp., manufacturers of electrical wires and cables, recently announced the purchase of two pieces of land totaling 37 acres in North Haven, Conn. to serve as a site for a plant and office building.

In making the announcement, the firm's president emphasized that no definite date has been set for the start of construction. He said this would depend on many factors, including the general business situation.

Coal Deposits

Crucible Steel Co. of America recently announced acquisition of rights to more than 13,000 surface acres of additional coal reserves.

The acreage, located at Hugheston, W. Va., on the Kanawha River, is expected to yield in excess of 20 million tons of high volatile metallurgical coal. At the firm's present rate of consumption, the newly acquired tonnage along with present coal holdings, makes available at least a 40-yr supply for the company, it is reported.

New Warehouse

Electric Steel Foundry Co. will soon move into a new office and warehouse in the mile high industrial center of Denver.

Upon completion of the move into the new warehouse, Esco will carry stocks on stainless steel sheet, plate, pipe, tubing, bar, fasteners, valves, fittings, as well as a complete line of polyvinyl chloride plastics.

R. E. Young was elected to the newly created position of special representative for the Electric Excavator Div., Harnischfeger Corp.

During his 41 yr with the company, Mr. Young has been intimately associated with the heavy mining industry and more particularly with open pit operations where electric excavators find their greatest application.

Two changes came about in Valvair Corporation—Sinclair-Collins Valve Co.

J. E. Collins, former president, has been selected for the newly-formed post of chairman of the board. Former executive vice president W. F. Kruspe succeeds Mr. Collins as company president and general manager. J. E. Collins was one of the company's original founders and Mr. Kruspe came to the firm in 1951.

Gardner-Denver Co. announced personnel changes.

Donald R. Boynton was made special assistant to the sales manager of the mining and construction division, and Robert W. Hoke, Jr. has been named district manager of the Toronto office. Mr. Boynton is a graduate from the University of Toronto and Mr. Hoke has a mechanical engineering degree from the University of Kansas.

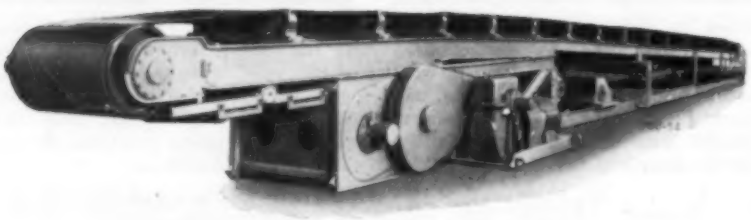
Eugene F. Daily, who has been manager of Atlas Powder Co.'s San Francisco explosives sales district, was named western construction manager for the company's explosives sales dept.

Mr. Daily, born in Minnesota and a graduate in civil engineering from the University of North Dakota, has been with Atlas since 1936.

Promotion of Martin J. Sweeney to the position of manager of General Tire & Rubber Co.'s Pittsburgh sales division has

For fast main-line haulage,

JEFFREY 80-A BELT CONVEYORS



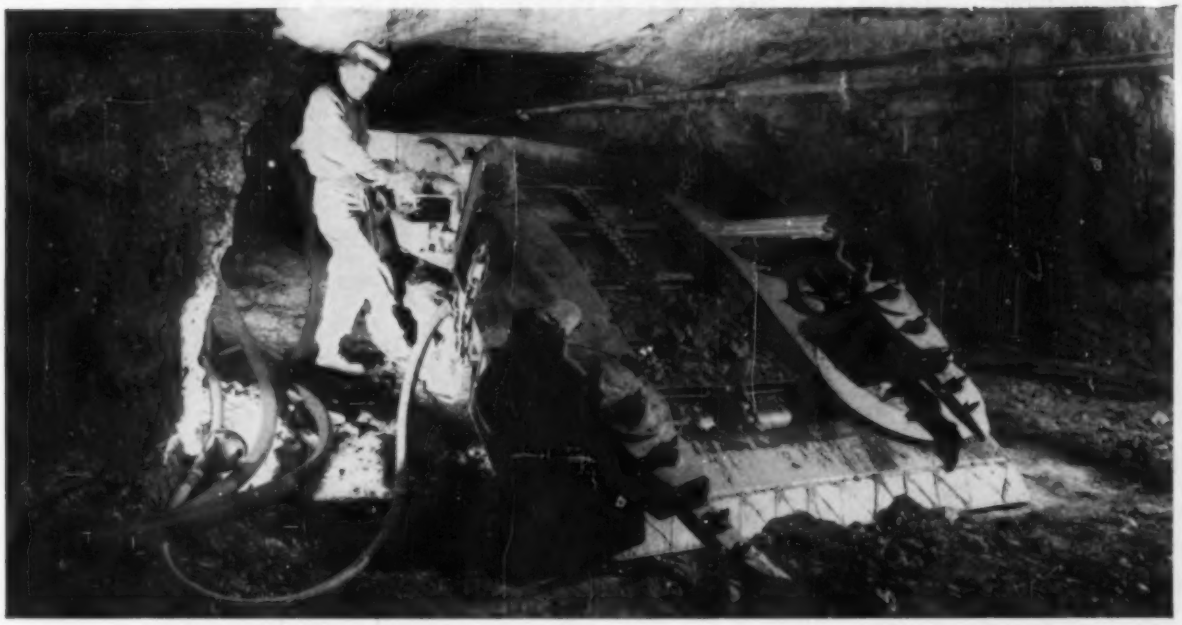
Record tonnages at the mine face demand that coal be hauled away fast, or production will bog down. Jeffrey offers a solution, the 80-A Belt Conveyor.

Its husky head was designed especially for rapid, heavy haulage... built for drives up to 160 HP and belt speeds up to 600 FPM. It has tandem drive for maximum contact with drive pulleys, and a pneumatic takeup for proper slack tension on the belt.

The 80-A frame is adaptable to 30, 36 and 42-inch conveyor belts and permits a choice of various standard Jeffrey idlers. Let us quote on your requirements. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT... TRANSMISSION MACHINERY... CONTRACT MANUFACTURING



LOADING MACHINE, equipped with 500 feet of Y-ground cable. Cable's Y-shaped ground conductor separates three phase-conductors, reducing danger of phase-to-phase faults if the cable becomes damaged.

New General Electric a-c mining cable helps prevent phase-to-phase faults

New General Electric portable cable with Y-ground construction is designed especially for use in a-c mining installations on a-c shuttle cars, loaders, and similar equipment. It offers the protection against phase-to-phase faults provided by a cable with a shielded construction without the complications inherent in a fully shielded cable.

The ground conductor is composed of special flat copper braid placed between the power conductors in such a way as to form a "Y." Because of this Y-shape, the ground conductor provides a barrier between the insulated conductors and, thus, helps to prevent phase-to-phase faults (see cross-sectional drawing).

This new General Electric Y-ground a-c mining cable, which carries U. S. Bureau of Mines marking, is easy to maintain and to splice. The braided construction of the mechanically strong and flexible Y-ground conductor provides long service life.

Bend and twist tests on this new cable, performed on a U. S. Navy Flexing Endurance Test machine, showed no damage to conductors even after more than 100,000 cycles. On impact test, using a 23-lb weight and 6½-inch drop, the cable withstood more than 35,000 impacts before failure was obtained. When failure did occur it was from a phase conductor to the Y-ground conductor—confirmation of the soundness of the design and construction.

Y-GROUND — Flexible copper braid forms ground barrier.

CONDUCTORS — Tinned copper, rope-stranded.

INSULATION—Mechanically tough, heat- and moisture-resistant rubber.

INNER JACKET—Tough neoprene with special twine reinforcement.

OUTER SHEATH—Abrasion-resistant neoprene with improved moisture resistance and superior physical characteristics.

Ask your General Electric representative for complete details about the new G-E a-c mining cable today. And for high-voltage distribution to underground a-c mine load-centers, ask him about G-E Geoprene* Type SH-D and Super Coronol* Geoprene mine power cables with special conductors for ground continuity check circuits. Or write for literature to Section W217-1214, Wire and Cable Department, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC

Manufacturers *(Continued)*

been made public by the company.

Mr. Sweeney has a wide background of experience in store operations along with territory and passenger tire sales managerial experience. He first joined the company in 1953, having come from another rubber firm.

Pettibone Mulliken Corp., manufacturer of materials handling machinery, has announced a major change in marketing channels for the company's line of equipment.

In line with an expansion program, regional offices, under the direction of regional managers, have been established from coast to coast, and all sales and service will come under their supervision. Included in the line of goods which will be handled will be electric and gasoline fork and platform lift trucks, tractors, trailers, cranes and loaders.

New products will soon contribute appreciably to total sales, officers of Burndy Corp. told the annual meeting of share owners at a recent meeting.

By the end of the fiscal year, it was pointed out, new products will account for over 33% of sales from Burndy divisions supplying components to electrical and electronic manufacturers.

In the interest of increasing the efficiency of its service to its customers and to consolidate management functions, U.S. Steel Corp. is making certain changes.

Headquarter offices of the U.S. Steel Homes Div., currently divided between Harrisburg, Pa., and New Albany, Ind., will be consolidated in Pittsburgh, Pa., H. D. Moulton, division president, declared recently.

Joseph P. Olds, formerly associated with L. B. Smith Corp., has recently been named anthracite sales engineer for Wilmot Engineering Co.

As coordinator of proposals and new equipment sales, Mr. Olds, assisted by sales representative, John Hildebrand, plans a full schedule of regulated visits to all field operations in the anthracite region.

Firth Sterling Inc., announces the promotion of Mr. Kenneth E. McKown to assistant manager, steel sales division.

He will be responsible for the sale and promotion of tool and die steel products, as well as drillrods, ground flat stock, tool bits, and shank steel. Associated with the company since 1942, Mr. McKown has been with carbide sales and cost accounting departments.

William L. Wearly was elected president of Joy Mfg. Co., manufacturer of heavy mining and industrial equipment, at a recent board of directors meeting.

Mr. Wearly, with the company 20 yr, started his career in the operating dept. of the Joy Franklin, Pa., plant and later became vice president in charge of sales. He leaves his present position of executive vice president, which will be filled by A. B. Drastrup, former assistant to the president.

Charles L. Ellis was selected as field engineer for the Construction Machinery Div., Clark Equipment Co.

Mr. Ellis has been an excavating contractor and has worked with the War Dept. He spent 3 yr in field engineering and product development with a manufacturer of earthmoving equipment and has written many articles for construction magazines.

Gordon E. Thorn was named central states regional manager for Hercules dump bodies and hydraulic hoists.

Born in Canada, Mr. Thorn moved to Gary, Indiana, with his family in 1929. A member of Warner Commercial Body, Inc., in Indianapolis, since 1952, he rose to vice president in charge of sales. For Hercules, he will handle sales and other related activities in Ohio, Indiana, Illinois and Missouri.

Floyd R. Anderson, chief metallurgist of the Denver division of Gardner-Denver Co., has been appointed assistant manager of the division.

Mr. Anderson's career, which started in 1925, includes membership in several national technical organizations, including the American Society for Metals. Another appointment by the company is that of Richard F. Schaffer to chief metallurgist of the Denver division. Schaffer has been with Gardner-Denver since 1940, when he joined the company as assistant metallurgist following his graduation from the Colorado School of Mines.

Homer W. Coleman, manager of explosives operations for Hercules Powder Co., has been appointed manager of Hercules' Explosives Dept. sales office at Birmingham, Ala.

A native of Wisconisco, Pa., and a graduate of Franklin and Marshall College, Mr. Coleman joined Hercules in 1940 as a chemist, and later, working in the explosives dept., gained experience in the use of explosives.

C. E. Flora was appointed manager of industrial sales, Davey Compressor Co., Kent, Ohio.

Mr. Flora will be in charge of all relations with the company's world-wide network of industrial distributors. Prior to joining Davey, Mr. Flora was compressor division manager, Binks Mfg. Co., Chicago.

SCPA *(Continued)*

Europe. Consequently, "today it is the very lifeblood of our existence." Why do we have this market? What can we do to keep it for the indefinite future?

Western Europe now is in the midst of a great revival and rebuilding program. Energy is a major consideration, and coal is the basic source of that energy—even more so since the Suez Canal closing, which forced users in Europe to face the fact that oil flow could be interrupted. Consequently, coal's position has firmed up, and since British and European mines cannot meet increased demands consumers must look to the U. S. Oil still remains a big coal competitor, however, and U. S. coal can stay in Europe only if it can compete with oil.

All in all, there will be a steady rise in the use of energy in western Europe, and the area will have to import for years to come—coal or oil or both. The U. S. can supply both. The market in Europe is important for U. S. coal, and consequently producers must give due heed to these factors:

1. Keeping ocean transportation rates down.

2. Providing and maintaining a continuous sales effort abroad commensurate with that put forth by oil.

3. Participating in the improvement of unloading facilities at foreign ports to eliminate this burden on overseas movement.

4. Selling on contract, and on a delivered-price basis, as far as practicable, to keep delivered prices stable as well as low as possible.

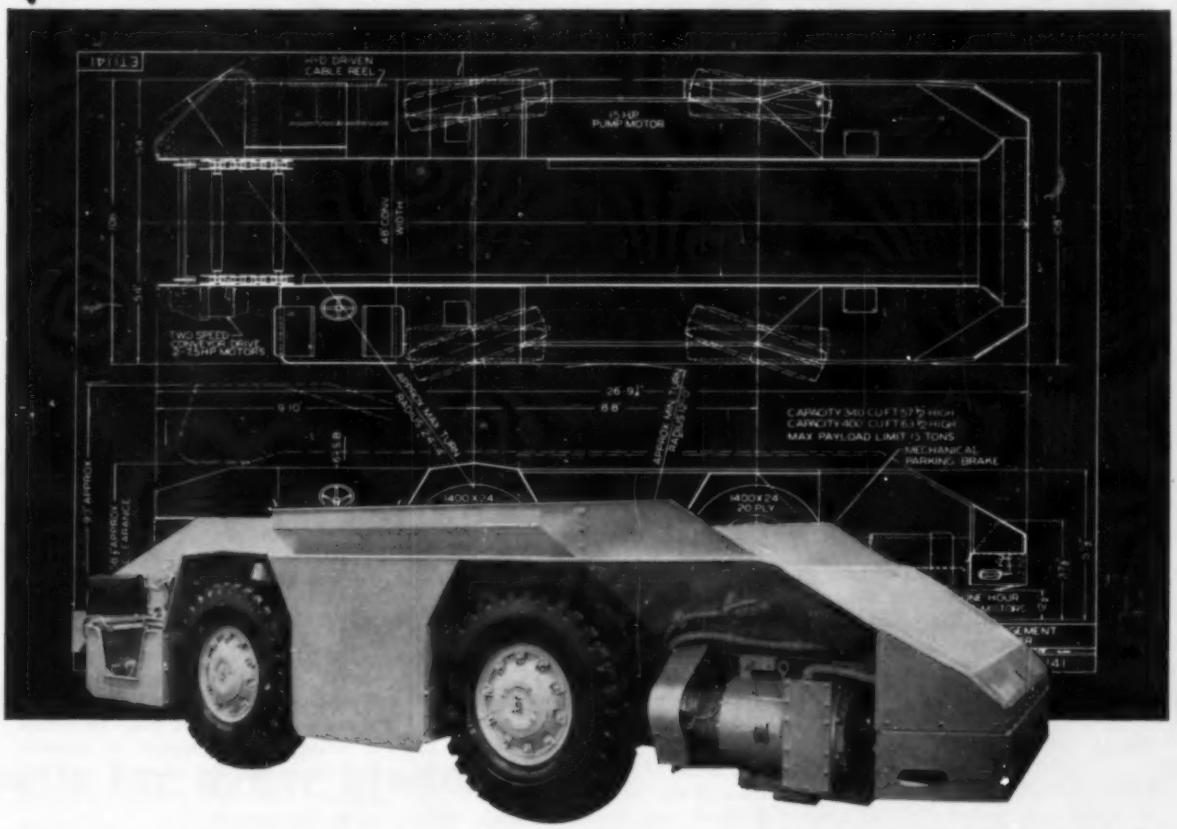
The ultimate market "depends entirely upon delivered cost." If it can be kept under oil, regardless of the origin of the oil, "we will have a market for many years to come."—**Herbert E. Jones Jr.**, executive vice president, Amherst Coal Co.

Coal for the U. S.

Technological changes in utilization can make for major shifts either favorable or unfavorable to coal in the years to come. Such developments have already had their effects in the past, as in the 1940-56 period, for example.

In coke, for instance, the advent of direct reduction could cut use of coal per ton of pig some 1,200 lb, and if oil or gas supplied the hydrogen the cut might even be greater. On the plus side, there is the possibility of regaining part of the railroad market. In residential and commercial space heating, it is hard to see too much hope for direct coal use, though the rise in the heat pump and in direct electric heating may provide an indirect boost for coal. And in the general industrial market, oil and gas will continue to compete, though

New! HAUL 15 TONS IN ONE LOAD WITH JOY HIGH SEAM SHUTTLE CAR


HYD DRIVEN CABLE REEL
15 HP PUMP MOTOR
TWO SPEED CONVEYOR DRIVE 7½ HP MOTORS
CAPACITY 360 CU FT 57½" HIGH
CAPACITY 400 CU FT 63" HIGH
MAX PAYLOAD LIMIT 15 TONS
MECHANICAL PARKING BRAKE
1400 X 24
1400 X 24 20 PLY

At last—a shuttle car designed specifically for *really* high seams . . . the Joy 15SC. This new shuttle car is 57" high . . . hauls 15 tons in one load. The result is easier, faster loading; fewer trips; cheaper haulage.

The 15 SC is powerful. Two 2-speed 25 HP traction motors, two 2-speed 7.5 HP conveyor motors and one 15 HP pump motor provide plenty of power for fast haulage regardless of conditions.

Maintenance is easier, too. Extra-rugged wheel-drive units, twin-boosted power steering, ventilated disc brakes, and special frame construction add up to money saving operation. And the Joy system of using five motors eliminates clutches, torque converters, complex gearing and transmissions.

The chart at right shows average tramming speeds that really roll up tonnage. If your operation will accommodate a 57" car, talk to your Joy engineer about the 15 SC . . . he's got 20 years of shuttle car experience behind him. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company, (Canada) Limited, Galt, Ontario.*

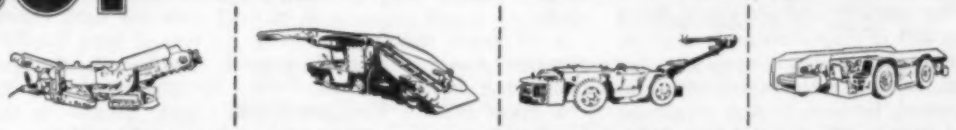
APPROXIMATE TRAMMING SPEED

Loaded level	4.45 mph
Empty level	5.9 mph
Loaded 8% grade	2.89 mph
Empty 8% grade	3.7 mph
Loaded 15% grade	2.35 mph
Empty 15% grade	3.0 mph

WRITE FOR FREE BULLETIN 206-1

WBW CL 6898-204

JOY EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY



CONTINUOUS MINERS, MOBILE LOADERS, SHUTTLE CARS, COAL CUTTERS, CUTTING MACHINE TRUCKS, COAL DRILLS, CONVEYORS, TIMBER SETTERS, SHUTTLE CAR ELEVATORS, BELT FEEDERS, FANS, BITS, PORTABLE BLOWERS, COMPRESSORS, ROCK DRILLS, HOISTS, CORE DRILLS

SCPA *(Continued)*

there are few indications of a major change one way or the other.

Cost is the major factor in fuel for electric power and here technological progress will play an important role, as will national policy on the imports of oil and oil products. If large imports are permitted, technological considerations may become unimportant.

Other technological considerations in determining the role of coal and other fuels in the future include the cost of finding and producing oil and gas; the mining, processing, transportation and utilization of coal; the possible commercialization of coal conversion processes and processes for recovery of oil from shale and tar sands, and so on.

If coal took on only 5% of the liquid-fuel market, it would require 71 million tons by the hydrogenation process and 100 million by Fischer-Tropsch; if it took 5% of the gas market, the annual coal requirements would be 30 to 41 million tons. Research offers many other possibilities—more than 200 for coal alone.

In making projections of possible demand and production, the possibility of major technological changes must always be considered.—**Harry Perry,** chief, Branch of Bituminous Coal Research, U. S. Dept. of the Interior.

Safety Congress *(Continued)*

Pa. on safety and operating problems of a modern haulage system. Other speakers were Harry J. Dusz, chief, Div. of Mines, State of Ohio, Columbus, Ohio, on how to auger mine safely; and a panel discussion of a cooperative program in accident prevention, led by Mr. Ferguson. Participants in the panel discussion were Arthur Bradbury, assistant to manager, coal properties, Inland Steel Co., Wheelwright, Ky.; C. A. Purcell, director, Indiana Bureau of Mines & Mining, Terre Haute, Ind.; L. W. Schuler, assistant director, Safety Div., UMWA, Washington, D. C.; and H. F. Weaver, chief, coal mine inspection div., USBM, Washington, D. C., substituting for James Westfield, assistant director, health and safety, USBM.

Analyzing the 82 haulage fatalities in bituminous coal mines in 1956, Mr. Kebblish said 71 occurred underground and 11 on the surface. Motormen accounted for 20 of these and brakemen 24, or nearly 54% of the total. A study of the causes of fatal accidents indicates that 29% of the victims were caught by moving equipment, 23% came in contact with low roof or crossbars, 16% were squeezed between haulage equipment and the rib, 13% occurred by collision, 10% by derailment and 9% from other minor causes related to haulage.

Since most of the haulage accidents involve motormen and brakemen, the management at Mathies mine planned at the start to develop a safe, efficient haulage system. Mathies was opened in 1944 and 18 million tons of coal have been produced without a haulage fatality, Mr. Kebblish said.

One safety feature of the Mathies system is two main parallel tracks for traffic in and out of the mine. This permits fast, safe and efficient handling of trains with a minimum of interference between loaded and empty trips. Further, trolleyphones are installed on all locomotives to speed communication between units.

Electric switches are installed at all main intersections, face entries and crossovers to align switches for fast transportation. Block signals also are installed at these intersections to stop traffic in all other directions.

All mainline track joints are welded and experience shows that the Thermit-welded joint is stronger and more durable than the electric-arc joint. Rails are laid on creosoted ties on 24-in centers in slag ballast. Whenever water appears on the road a 5x6-ft sump is dug in the nearest breakthrough. A small automatically operated centrifugal pump is installed and the sump is covered, Mr. Kebblish said.

Since Mathies has grown in size three 50-ton locomotives were purchased to handle 40 or 50 loaded mine cars per trip. Some of the important safety features of the 50-ton units cited by Mr. Kebblish were dynamic braking, trolley retractor, heavy-duty end sections, recessed head lights, fire extinguishers and rerailers.

In conclusion, Mr. Kebblish said haulage fatalities can be reduced by strict compliance with the Federal Safety Code, the state mining laws and the various safety rules of the mine.

Safe Auger Mining

Much of the difficulty at the beginning of augering was caused by lack of regulations and each deputy inspector had his own rules, Mr. Dusz said in opening his talk on safe augering practices. But in 1954 a list of tentative rules and regulations was made. These are as follows:

1. A safety lamp shall be kept at the workings at all times while augering.

2. No person shall enter auger holes except to save a life or recover equipment.

3. All augers shall have a shield or protective device to prevent material from falling on the workmen.

4. Before augering, the highwall shall be cleared of loose material and made safe.

5. Where men are required to walk on equipment, a hand rail shall be erected.

6. The exhaust pipe from the motor on the hydraulic system shall be extended to prevent exhaust fumes from contacting the operator.

7. The fan of the motor shall be guarded.

8. A walkway shall be installed over the bit coupling directly in front of the motor cab.

9. Steps shall be provided on the side opposite the hydraulic motor on large machines.

10. Openings between the steps and walkway near the large upright post on the left side of the auger should be covered to make a larger landing.

11. If the auger is to be worked at night, lights shall be installed.

12. Rope drums, chain drives, shaft coupling and motor fans shall be enclosed.

13. No person shall cross over bits while they are in motion.

14. It is not desirable for surveyors to enter the holes; therefore, it is necessary for the mine foreman to keep a record of the depth of all holes. These data should be plotted on a map.

Accident Prevention

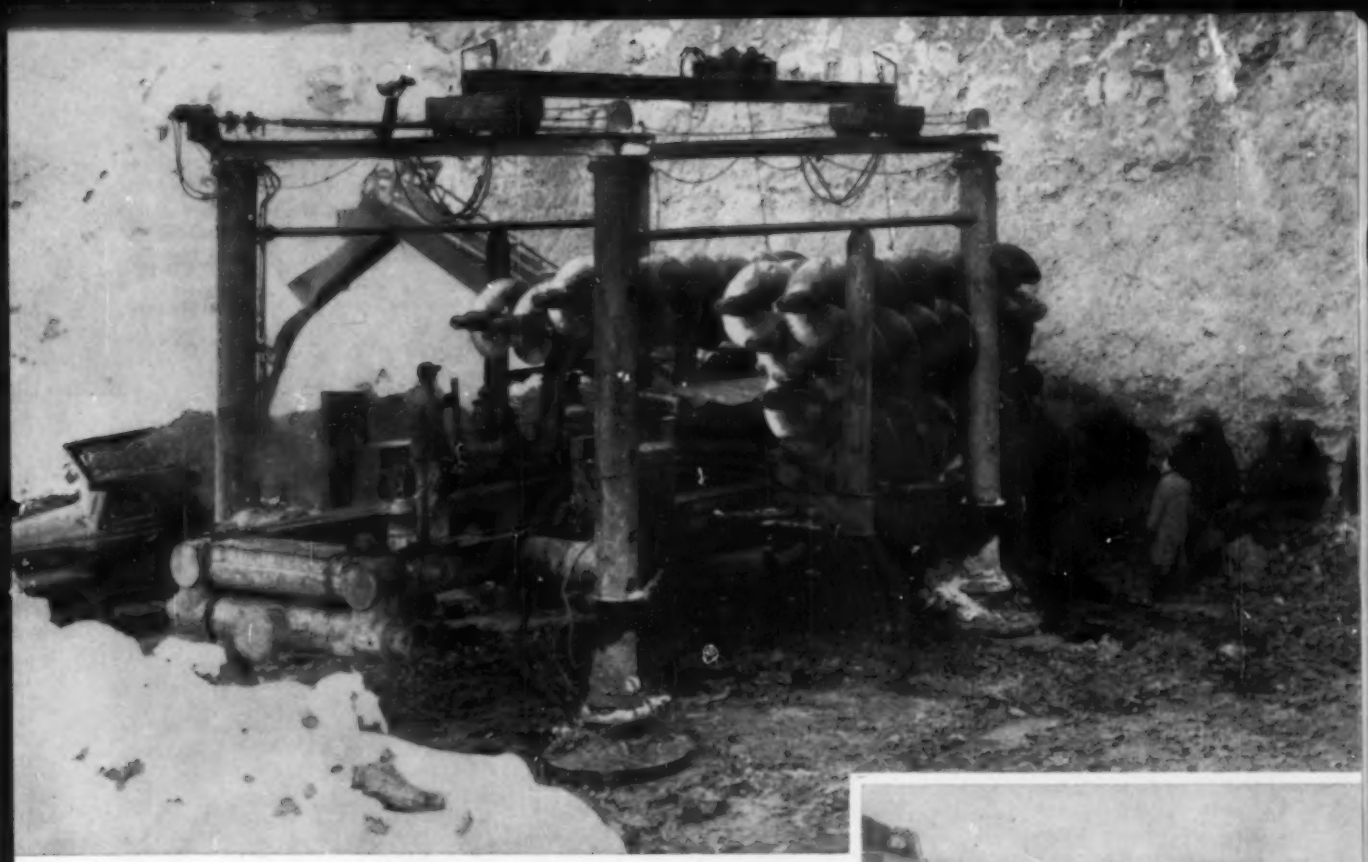
The responsibility for safety should be shared by labor and management, Mr. Bradbury said, in giving the viewpoint of the employer in the panel discussion of a cooperative program in accident prevention. But the planning and initiating of a successful program is squarely up to management.

Safety and efficiency are inseparable, Mr. Bradbury continued. Fewer accidents result in increased production and lower costs, direct savings through lower compensation charges, improved labor and public relations.

When organizing for safety, the greatest possible use should be made of all available services. It is management's function to provide a safety department manned by an adequate and qualified staff. And it is vitally important that top management's unequivocal support of this department is recognized throughout the organization. In conclusion, Mr. Bradbury said he believed the key to accident prevention is the degree of interest that can be aroused and maintained among the entire working force.

Speaking on the cooperative effort in Indiana, Mr. Purcell said that management must take the lead but that the various inspection agencies can do much with the right approach and the attitude of being helpful rather than playing the role of a policeman.

The most compelling reason for a safety program is the welfare of the men who produce the Nation's coal, and the job of promoting safety is one at



Brutal coal-boring service calls for auger blades of USS COR-TEN Steel

CRUNCHING through wet, abrasive coal and rock in sub-zero temperatures is the kind of murderous service that takes the bite out of boring equipment—but fast! In this case, however, TASA Coal Company of Pittsburgh, Pa., reduced auger wear and corrosion to a minimum, by fabricating replacement blades from 5/16-inch COR-TEN Steel.

Each section of auger is 17 feet long. The blades, or flights, are 42 inches in diameter. As each section chews into the coal vein to its full length, the chuck is opened and another section is added on. This particular coal seam near Clarksburg, W. Va., was penetrated to a depth of 200 feet.

These blades of USS COR-TEN Steel are the logical answer to the constant destructive forces of abrasion and corrosion. COR-TEN has, in addition to its high strength (50,000 psi. min. yield point) and abrasion resistance, 4 to 6 times greater resistance to atmospheric corrosion than carbon steel.

All three USS High Strength Steels—COR-TEN, MAN-TEN, and TRI-TEN "E"—enable mining equipment to give far more service per dollar of cost than structural carbon steel. They possess a 50% higher yield point, and, in varying degrees, offer greater resistance to wear, fatigue, abrasion and impact. These USS High Strength Steels are used to replace carbon steel in the vital parts of mine cars, dozers, shovels, drag lines and other such equipment to increase service life without increasing dead weight. Where the use of thinner sections is feasible, they can frequently (1) reduce equipment weight without reducing its strength, or (2) increase the size and capacity of equipment without increasing the total weight or the power needed to move it.

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Safety Congress (*Continued*)

which everyone must work all the time, Mr. Schuler declared. To gain cooperation in safety, the safety division of the international union has engaged in a number of activities which have made major contributions to the safety movement.

Substituting for James Westfield, Mr. Weaver said that throughout its 47 yr of existence the USBM has been essentially an educational institution. Since 1947 approximately 195,000 workers and supervisors have completed the Bureau's coal-mine accident-prevention course. Without the cooperation of the mining companies and the UMWA, this record would have been impossible.

Safety in Mine Development

Lead-off speaker at the Wednesday session was G. W. McCaa, general manager, Hanna Coal Co., Moundsville, W. Va., on safety features in the design and development of Ireland mine. Other speakers and subjects were R. J. Wacht, product engineer, Joy Mfg. Co., New Philadelphia, Ohio, on dust collection at the face with continuous mining; and H. F. Weaver, chief, Div. of Coal Mine Inspection, USBM, Washington, D. C., who summarized gas ignitions and fires in coal mines since enactment of the Federal Coal Mine Safety Act, and offered recommendations to prevent recurrences.

In designing and developing Ireland mine, the company's aim was to make it the safest and most efficient mine possible. Safety in the design of all equipment and mining plans has been given primary consideration to protect the lives of employees, Mr. McCaa said.

The most serious safety problem is the protection of workers from falls of roof and rib in the working area. In the original mining plans the company decided to use continuous miners to the fullest extent possible. Roof-bolting was first done as a separate operation but later, to protect the operator of the machine, hydraulic bolting equipment powered by one of the cutter motors was fitted to the machine. Two roof-bolting units, one on each side, were installed in place of the hydraulic timber jacks. This permitted bolts to be installed ahead of the operator and within 13 ft of the face. The hydraulic timber jacks were moved ahead of the bolters and two 60-lb rails were installed on the jacks as crossbars to protect the roof-bolters, Mr. McCaa explained.

The company is experimenting with a boring-type continuous miner, using the same type of roof support, except that bolting units operate independently, being attached to the machine with a hydraulic jack and rope.

In describing the method of maintaining the main entries, Mr. McCaa said that plans call for draw rock to be ripped down and the roof coal above it bolted, wire meshed and gunited. To obtain haulage height, the bottom is graded.

Use of continuous miners and heavy cover made it necessary to consider changes in mining practices. Although pillaring will be tried, the general plan calls for partial recovery. Panels will be developed with three continuous miners to get the most rapid extraction possible, Mr. McCaa explained.

The most serious safety problem is the training of employees. The USBM conducted its accident-prevention course with 100% participation. Classes now are being organized in safety and mining, and will be conducted at the mine by various men in the organization. First-aid and mine-rescue classes also are planned. In conclusion, Mr. McCaa said that the mine has received excellent cooperation from the UMWA, USBM and West Virginia Dept. of Mines, and with their assistance the company hopes to make Ireland mine the safest in the country.

Dust Collection

Results of field studies of a Joy Microdyne dust collector used with a continuous miner indicate that such a collector can be used in conjunction with normal ventilation practices, Mr. Wacht said. Dust concentrations at the face as well as dust in the return air can be materially reduced by dividing the air between the dust collector and the return-air brattice line.

Tests showed that with proper placement of the inlet tube with respect to the coal face and machine operator, the dust count at the operator was reduced from an average of 71 million particles per cu ft to 10 million. The count in the return air, which was mixed with untreated air from the face, was reduced from 156 to 14 million particles per cu ft with only one-fifth of the total ventilation being diverted through the collector, Mr. Wacht added.

The study also showed that by dispensing with line brattice and using the collector to provide total face ventilation, dust at the operator's position can be held well below 25 million particles per cu ft while the dust in the return air can be as low as 6 million.

Collection efficiencies for the collector tested showed 90% by count and 99% by weight on dust normally found in continuous mining operations, Mr. Wacht reported.

Gas Ignitions and Fires

Administration of the Federal Coal Mine Safety Act has assisted materially in reducing the probability of major disasters in coal mines. Nevertheless, the frequency of mine fires and gas and dust ignitions of a less severe nature indicates that much must be done before the possibility of serious catastrophes can be controlled to the extent that the industry can feel that the law of averages will not catch up with it, Mr. Weaver reported.

A breakdown of the agents responsible for fires and ignitions reported reveals that electrical circuits and equipment should be of primary concern. Next in importance, Mr. Weaver continued is improper use of explosives. Friction on belt conveyors ranked second as a cause of mine fires.

The USBM is continuing its program to develop ways of promoting the elimination of the major causes of mine fires and explosions. Some features of this program, Mr. Weaver said, include setting up fire-control standards; experimental work on the use of foam plugs to fight mine fires; studying causes of underground belt fires; making permissibility tests of electric face equipment; researching nonflammable hydraulic fluids for use in mine equipment; conducting special electrical inspections; researching rock-dusting methods and searching for a substitute for rock dusting.

Illinois Meet (*Continued*)

automatic controls, impulse application, refuse removal and so on.

A unit in operation at the Northern Pacific operation at Roslyn, Wash., treats 40 tph of ¼x0 with refuse varying from 10 to 50%. It is performing very satisfactorily under difficult conditions, Mr. Rhodes added. Automatic controls permit the washer to deliver a product with consistent ash even though the ash percentage in the feed varies widely. No attendant is needed even though the rate of feed also varies greatly.

A typical example of washer performance shows 97% overall efficiency for ¼x48M with feed ash 29%, washed coal ash 11%, refuse ash 69%, and reject 31%. Feed was 40 tph. Near-gravity accumulation was 11% at 1.55 specific gravity.

Ammonium-Nitrate Blasting Agents

The use of ammonium nitrate as a source of explosive energy is not new, Mr. Parrott said. It was well known, as far back as 50 yr ago, that ammonium nitrate while insensitive to detonation itself, could be sensitized and under proper conditions be made to explode.

Ammonium nitrate has the disadvantage that it is only about 70% as strong as nitroglycerin and is hygroscopic. But it is much less sensitive and less expensive. The use of increasing portions of ammonium nitrate has resulted in dynamites that are less hazardous to manufacture,

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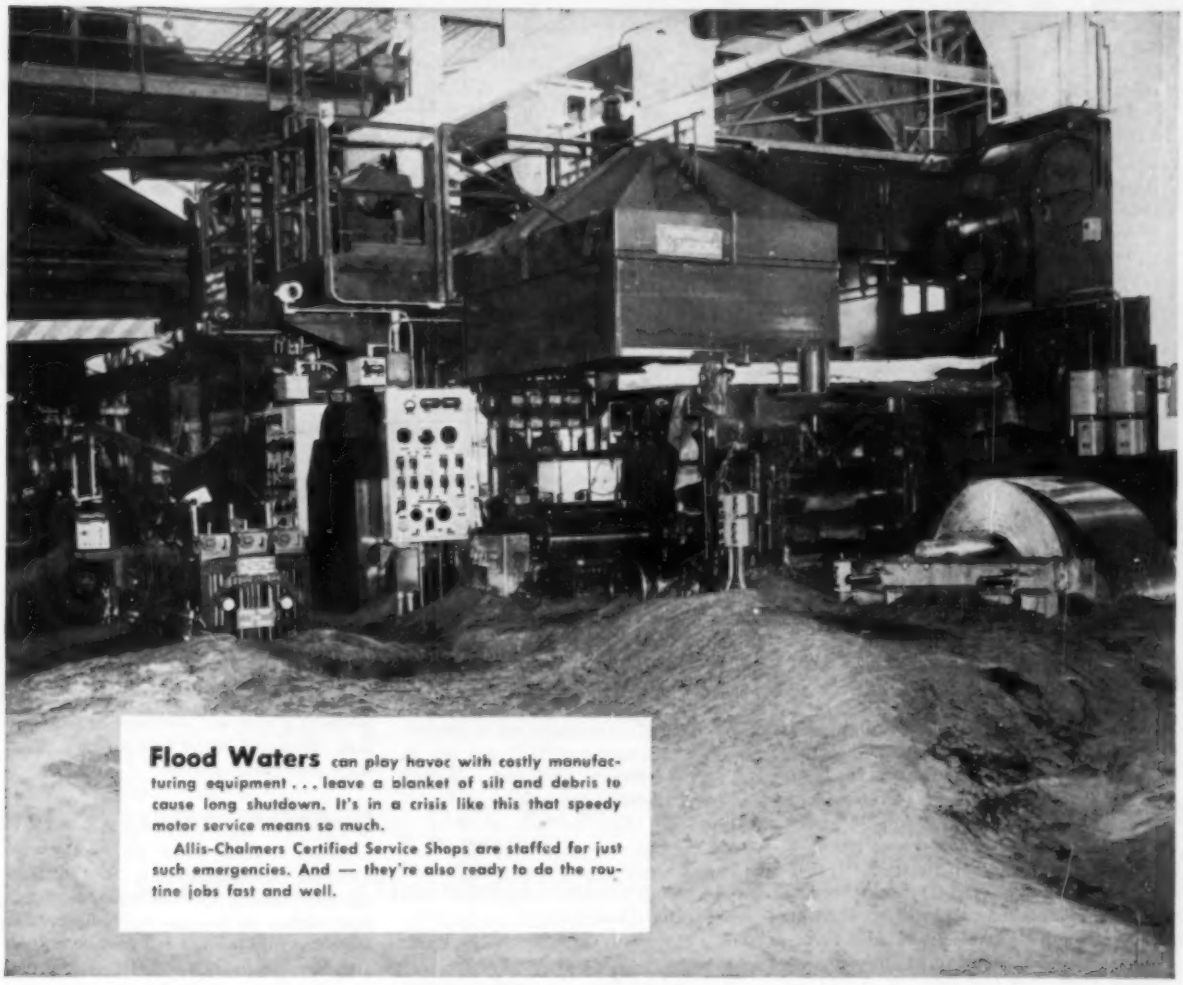

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Illinois Meet (*Continued*)

handle and use, and cost less per unit of energy.

The trend toward cheaper and safer explosives culminated in the development of the blasting agent Nitramon, which contains no nitroglycerin. This product and Nitramex, the stronger, high density canned product, were recognized as the ultimate in safety for large-hole blasting.

The next development of importance with ammonium nitrate took place a few years ago with the invention of Akremite. Since then there have been a number of modifications of this type of blasting agent. All of these consist of ammonium nitrate, usually in the prilled form, containing a small percentage of combustible material to provide sensitivity and produce maximum strength, Mr. Parrott continued.

The original Akremite was made with a carbon black as a fuel, but solid fuels have now largely been replaced by oil because of economy, convenience and availability. While some operators prefer a packaged product, the ultimate in simplicity is preparation of the mixture at the hole. Sometimes the prills are poured into the holes and oil added with or following prills. Other times oil is added to each bag prior to loading and left to percolate through the contents.

The proper quantity of oil to be added to produce a good oxygen-balanced mix is about 6% by weight, although slight variations are not critical. Prfilled ammonium nitrate will absorb and hold just about the correct quantity. The standard proportion is usually 1 gal of oil for an 80-lb bag, or 3 pt for a 50-lb bag, Mr. Parrott said.

To obtain satisfactory results, proper priming is important. In general, the high-velocity high-strength dynamites are better primers than those of medium or low strength and velocity. Under favorable conditions individual primers, at least 10 lb and 40% strength, should be spaced every 20 ft in the column load. In some instances operators have adopted a ratio as high as 10 or 15%, Mr. Parrott said.

A number of other chemical materials could be used as a sensitizer and fuel, but some of them would result in cap-sensitive compositions with varying degrees of sensitivity which would be extremely hazardous to mix, handle or use. Likewise, mixing of high explosives into prill-oil compositions is very dangerous, Mr. Parrott warned.

KMI (*Continued*)

Bell & Zoller employs the Goodman boring-type machine, Mr. Ingram said, to achieve a production of 31.2 tons per man-shift. This is on a raw-coal basis, including 14% reject. One of the features of the operation is the use of prefabricated stoppings which are made on the surface to fit the cross section left by the boring machines.

Co-chairmen of the opening session were Aubin Higgins, West Kentucky Coal Co., Madisonville, Ky., and B. F. Reed, Turner-Elkhorn Coal Co., Drift, Ky.

Deep-Mine AC Power

First speaker at the Friday morning session was C. S. Conrad, maintenance superintendent, Consolidation Coal Co. (W. Va.) Div., Pittsburgh Consolidation Coal Co., Fairmont, W. Va., on the benefits which derive from the use of AC power underground. Co-chairmen were T. T. Pattison, National Mine Service Co., Pittsburgh, Pa., and Mr. Yarborough.

Mr. Conrad reiterated the advantages of AC power for underground use, such as, increased safety, improved machine performance, reduced maintenance costs, lower investment and lower equipment costs. He described in detail the layout of surface lines and underground systems, with emphasis on protective devices and grounding systems.

Mr. Conrad noted that from personal observation he sees no appreciable difference in cost between AC-powered mining equipment and DC. However, the investment in the two distribution systems show AC ahead by a wide margin. Mr. Conrad cited examples, as follows:

A DC conversion unit to furnish power to DC equipment on a producing section would cost $127 per kva in the 300- to 500-kw sizes, not including protective devices for individual feeder cables.

An AC power unit, providing 440 V to section equipment, would cost $48 per kw, including protective equipment and power-factor connection.

In a system using high-voltage transmission to a conversion unit close to a section and retaining the same protective scheme as in an "all-AC" system, the installed cost would be $177 per kw.

In an "all-AC" system, the installed cost would be $115 per kw, including powerfactor connection

Hydraulic Fluid

Fire-resistant hydraulic fluids—their development and testing—was the subject of papers by S. P. Polack, mining health and safety engineer, USBM, Pittsburgh, and Joseph J. Slomer, hydraulics engineer, Goodman Mfg. Co., Chicago, Ill.

After describing the Bureau's survey of hydraulic-fluid consumption in the coal industry, which revealed that 1 gal is used for every 25.2 tons of coal mined mechanically (see *Coal Age*, January, 1957, p 82), Mr. Polack reported statistics for Kentucky alone indicating that 1,160,000 gal was consumed in that state alone in 1956. All of it is petroleum-based and thus flammable.

Mr. Polack reported that extensive testing of fire-resistant synthetic fluids and other types, such as oil-water emulsions, is being done by National Tube Div., U. S. Steel Corp. In the works are plans for extensive field tests, and the full research has resulted in the planned marketing of one such product by a large oil company.

Operating temperature is a critical factor in the development of such fluids, Mr. Slomer said, in reporting that several companies now are conducting research programs with the aim of recommending a test set-up which can be used as a standard by ASTM. Any fluid can be checked on a test stand for a period of, say, 100 hr at 140 F and a pressure of 2,000 psi to determine its wear qualities. The fluid also will be tested at other temperatures to determine at what level the pump will fail to deliver fluid, under pressure, as a result of vaporization.

The tests made by the various companies will include vane, gear and piston pumps. At present, four fluids being tested are:

Sun nonflammable hydraulic oil No. 15.

Texaco hydraulic fluid FR.

Pure Oil fire-resistant hydraulic fluid.

Shell hydraulic oil No. 73.

These must be used at 140 F or below. Most present machines operate with temperatures of from 150 F to 175 F in the hydraulic systems. To reduce temperature it may be necessary to increase tank volume or install heat exchangers in the spray-water systems.

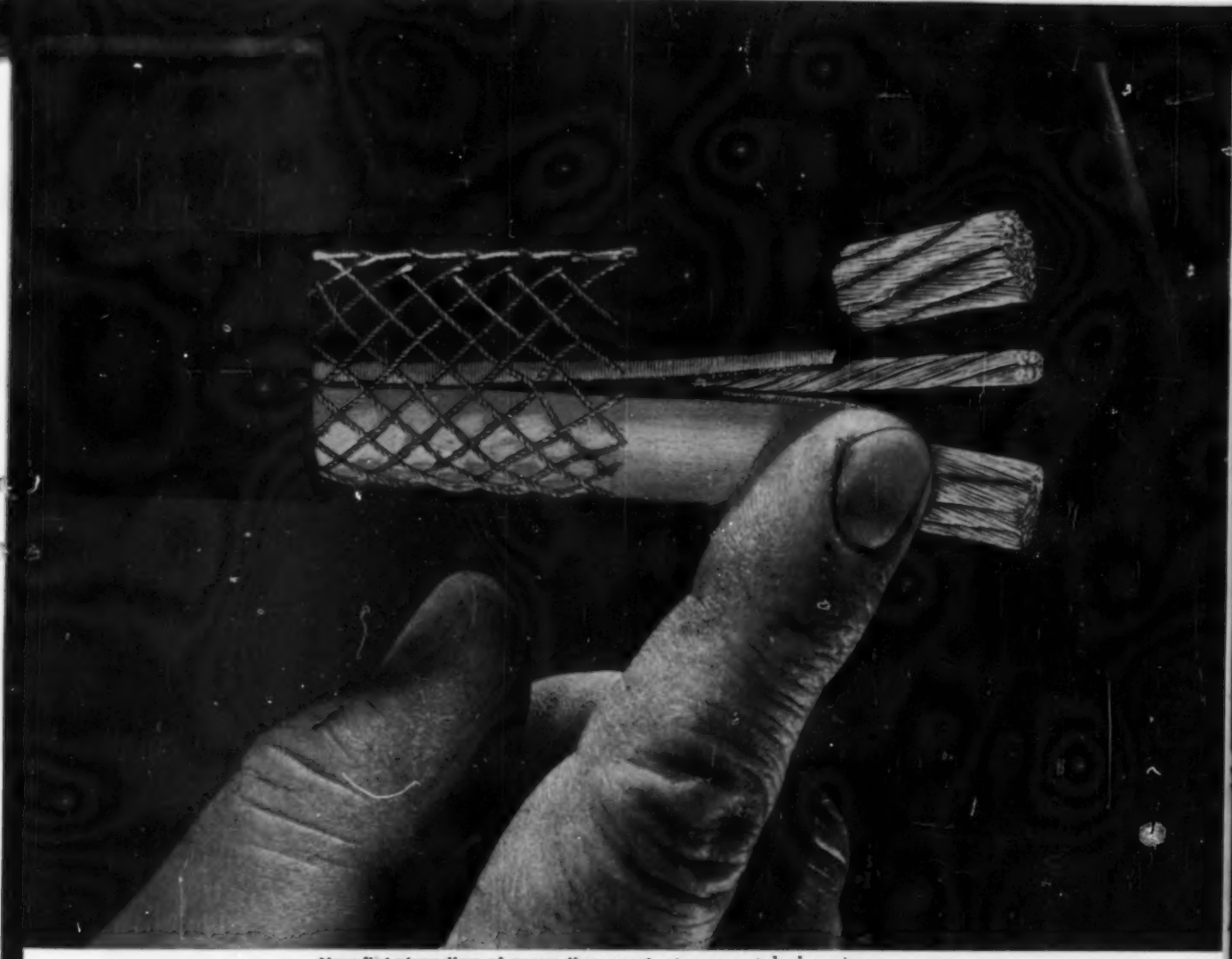
Downtime, Absenteeism

Noting a relationship between downtime and absenteeism, R. M. Fleming, associate editor, *Mechanization*, reported that studies at a mine in Pennsylvania indicated that the few habitual absentees are often linked with downtime when the underlying causes of the downtime are sought out.

Some way of calculating the actual cost of downtime to the employer may be worked out, Mr. Fleming said, in order that management may know, in terms of dollars, what downtime really costs.

In one example, Mr. Fleming selected a mine employing five mining units working two shifts. Figuring back from annual cost of operation and potential production per unit, the cost of downtime is $363.40 per hr per unit. However, the cost of downtime in the main-haulage system at this mine would result in a downtime cost of $1,817 per hr, since all units would be affected.

Opening feature of the concluding session on Friday afternoon was a full de-



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KMI (*Continued*)

scription of the four Colmol models offering a mining range of from 28 in to 96 in, by Joseph J. Larry, sales engineer, Jeffrey Mfg. Co., Columbus, Ohio. Included in Mr. Larry's presentation was a 30-min silent film on Colmol operating characteristics and applications.

Workmen's Compensation

Rate-making in workmen's compensation is not an arbitrary procedure but a process of studious calculation, said W. S. Williams, special representative, Bituminous Casualty Corp., Pikeville, Ky. The rating as applied to small mines usually is prospective, foretelling their future experience. Retrospective rating is applicable to larger mines, and it encourages accident-prevention work by promising monetary reward.

On the relative performance of large and small mines, Mr. Williams reported figures to show that losses are higher in mines with annual payroll of less than $30,000. This is reflected in the premium rates, $3.17 for large mines against $5.41 for small mines.

The problems at small mines were listed by Mr. Williams as follows:

1. Lackadaisical concern on the part of small producers.
2. "Gang" work in operation of mines.
3. Lack of centralized authority.
4. Lack of financial fitness for the production of coal.
5. Obscure responsibilities.
6. Antiquated equipment.
7. Laxness in taking advantage of educational opportunities.
8. "It can't happen to me" attitude.

In discussion, Harold J. Grafton, chief mining engineer, Eureka Casualty Co., Philadelphia, Pa., reiterated that rate-making is a serious pursuit of the insurance companies. He pointed out also that safety is an end unto itself, and that reduced premiums are a dividend for good safety performance.

Concluding the program was a report by James H. Phalan, chief, Dept. of Mines and Minerals, Lexington, Ky., on 15 fires which occurred in the past year.

AIME—W. Va. (*Continued*)

2 ft of advance of the drill, a charge of ammonium nitrate would be detonated in the gun. The gases would issue from ports near the muzzle. The unit would consist of perhaps two of these drills and a bottom-trimming chain. The basic work on the explosive is completed, Mr. von Stroh said, and the gun-drill is now in design stages. It is estimated powder cost would be 10c per ton and possibilities are that with such devices, 14BU loading machines could be converted into low-vein continuous miners.

Gas-Well Pillars

Final paper at the Friday morning session concerned the problem of providing protection around gas wells by George J. Donaldson, mining engineer, People's Natural Gas Co., and J. G. Tilton, mining engineer, Equitable Natural Gas Co., Pittsburgh, Pa. Mr. Donaldson, in presenting the paper, reported on the Pennsylvania standards relating to the sizes of gas-well pillars. The specifications are the result of studies made by a committee consisting of engineers from the gas and coal industries. The Pennsylvania law requires that pillars around gas wells will have a minimum bearing area of 3,600 sq ft, with the well in the center of the pillar. The corners are not to be rounded. The required bearing area increases with depth of cover and the specifications provide for splitting at the outer limits of protective pillars in order that mining projections will not be destroyed. On the legal question of who pays for the coal left in the pillars, Mr. Donaldson pointed out that the prior rights would govern.

Taxation, Mine Valuation

The Friday afternoon session was devoted to presentations on income tax treatment of exploration and development costs, and the economic, technical and legislative changes in mine valuation factors. George O. Tarleton, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, presided.

Henry B. Fernald, Loomis, Suffern & Fernald, New York, N. Y., discussed income tax treatment of exploration and development, emphasizing that each particular case requires competent legal counsel, inasmuch as interpretations and rulings on the 1954 changes in the tax laws have not yet been published by Internal Revenue Service.

The paper on changes in mine valuation was prepared by S. H. Dolbear and F. H. Madison, Behre, Dolbear & Co., New York, and read by C. W. Porterfield.

European Coal

Opening feature on Saturday morning was a survey of the coal situation in Europe, prepared by George Lamb, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh, and read by R. G. Lazzell. Co-chairmen were D. F. Crickmer, Pocahontas Land Co., and C. W. Porterfield, Pocahontas Fuel Co., Pocahontas, Va. Coal consumption in 1956 in Europe amounted to 560 million tons, Mr. Lamb said, and in 1965 consumption is expected to be 629 million tons. At that time European production is expected to be 582 million tons, thus imports then may be at the present level. An unbalancing factor could be changes in the distribution of world oil. In pointing out some of the difficulties in increasing coal production in Europe, Mr. Lamb estimated that new capacity over there costs about $40 per ton of annual output. Furthermore, labor is in short supply.

Continuous Mining

A slide film description of Goodman boring type mining machines was presented by William Laird, mining engineer, Eastern Gas and Fuel Associates, Grant Town, W. Va. The units at Grant Town employ ten-man crews operating on a development scheme which consists of driving three entries on 72-ft centers. Rooms are driven right and left from these entries and pillars are recovered by taking successive lifts leaving 4 to 5 ft fenders between lifts. Production per unit has amounted to 1,498 tpd or 60.7 tons per man shift. Bit cost is 2c per ton. It was explained by Mr. Laird that size consist includes less coal in the stoker sizes and more fines and lump than in conventional mining. The continuous machines are followed by pickup loaders which discharge into shuttle cars. Goodman Ropex belts provide intermediate transportation to a track haulage system.

The final paper of the two-day meeting was presented by R. L. Chambers, assistant treasurer, Pocahontas Fuel Co., Pocahontas, Va. on mechanized office procedures. Mr. Chambers described the use of IBM equipment in preparing payrolls, labor distribution, making cost reports, providing production reports, keeping inventory of reports and handling accounts payable. One of the big advantages of mechanized office procedure is in the timeliness of the completed reports, Mr. Chambers said. For example, cost and production reports can be in the hands of mine superintendents while they can make use of the information.

In this issue . . .

Your annual index to the 1957 issues of *Coal Age* begins on p 174. In it you will find all articles, regular monthly departments and news features listed according to subject and the mine or company source of the information. Keep this issue handy to help you quickly find the articles you need.

This annual index and the Mid-July *Coal Age* Mining Guidebook, two exclusive services of *Coal Age* to the industry's management, place a wealth of valuable reference material on new equipment, methods and developments right at your fingertips.

Using dry, high-test Peladow, one man unloads and at the same time prepares freezeproofing solution.

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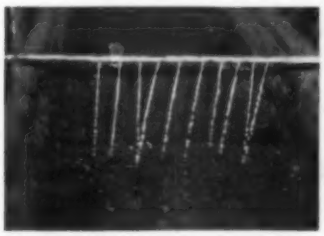

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1. **If you need equipment, materials and services not previously used . . .**
2. **If you are interested in additional sources of equipment, materials and services . . .**
3. **If you are developing a new idea in production, preparation and safety and want to see what's available for carrying it out . . .**

Check the Buying Directory beginning on p 289. Find the product in the alphabetical list. Under it will appear the names of the key manufacturers, with those advertising in this issue indicated by **black-faced** type.

Consult the manufacturers' advertisements in this issue for information on specific products, materials and services. To locate the local source of supply nearest you, check the list of advertisers district sales offices and distributors provided at the end of this issue.

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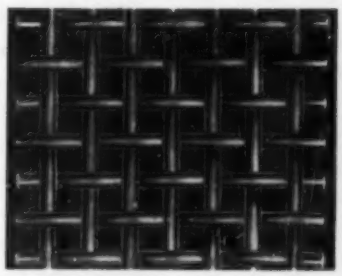

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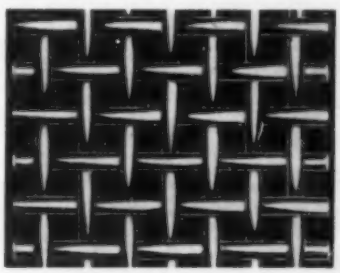

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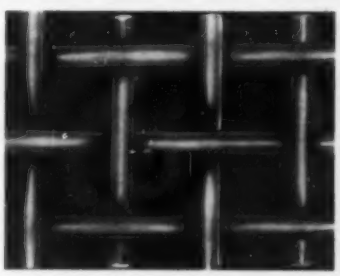

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2—PT12 Long Piggyback Conv. (W)
32—Goodman Power Duckbills, Model 477 (W)

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3—7B Sullivans (W)
12—11B Sullivans, 35 & 50 H.P. (W)
8—12AB & 12AA Standard Goodmans (C&W)
3—112AA Universal Goodmans (W)
3—212AA Baby Goodmans, 250 V. (W&C)
3—21263 Baby Goodmans, 220/440 (W)
9—512 Goodmans 2 w/Buggdustor (W)
3—712 Goodmans (C)
1—824 Goodman, 42" T.G. (C)
1—29A Jeffrey Arc Wall (W)
1—29U Jeffrey 220/440V, 42" T.G., Excellent (C)
1—29UR Jeffrey Rubber Mtd. (C)
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34—35R & 35BB Jeffreys as is or rebuilt, w/stub axle trucks (C&W)
1—Lot Machine Trucks for Jeffrey & Goodman (C)

LOCOMOTIVES

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4—4 Ton MH96 Jeffreys (W&C)
1—4 Ton MH121 Jeffrey (W)
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60—48" T.G., S.D. Drop Bottoms (W)

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1—100KW Int. Diesel Generator Set (C)
1—100KW MG Set, 220/440 Volt (C)
1—75KW Diesel Generator Set (W)
1—150KW Rotary, Completely Automatic (W)
1—150KW Reliance MG, Set 2300/4000 Volt (W)
2—150KW MG Sets (W)
4—200KW MG Sets (C)
1—150KW Rotary Armature (W)
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2—6 ton Jeffrey, 18" gauge
1—6 ton Goodman, 18" gauge
2—10 T. Jeffrey 42" ga.
1—13 T. Goodman, 42" ga.
1—13 Jeffrey, 42" ga.
1—15 T. Jeffrey, 42" ga.

SHUTTLE CARS
1—Joy model 6DD3P, battery operated
7—Joy model 6DD1, battery operated

MINE FANS
1—120" Joy La-Del axial flow fan, model L-14
1—7' Jeffrey aerodyne 2 stage fan

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2—125-250 H.P. Ottumwa Single Drum
1—250 H.P. Ottumwa Single Drum and many other hoists in stock, single and double drum. 10 H.P. to 250 H.P.

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DRILLS—EUCLIDS

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621-S Page Diesel Drag, 135', 6 yd.
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4500 Manitowoc Drag, 120', 5 yd.
5-W Bucyrus Erie Drag, 120', 5 yd.
111-M Marion Drag, 100', 4 yd.
1201 Lima Drag, 85', 3 yd.
54-B Bucyrus Erie Drag, 120', 5 yd.
2400 Lima 5½ yd. H. L. Shovel
120-B Bucyrus Erie 4 yd. Elec. Shovel
1201 Lima 3½ yd. Standard Shovel
3500 Manitowoc 2 yd. H. L. Shovel
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Hazleton, Pa. GLadstone 5-3658

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3—Joy 14 BU Loaders, low pedestal, 7AE.
2—Joy 14 BU Loaders, medium pedestal, 7 ABE.
1—Joy 14 BU Loader, high pedestal, 7 BE.
2—Joy 12-BU Loaders, BE, latest type.
1—Joy 20-BU Loader, latest type.
1—Joy 11 BU Loader, latest type.
2—Joy 8 BU Loaders, 250 volt DC.
1—Joy 8 BU Loaders 34" overall height.
2—Joy 8 BU Loader, 220 volt AC.
2—Joy curved Bar Heads, complete.
3—Reliance 38-J Motors, 10 H. P.
4—Reliance 24-J Motors, 7½ H. P.
5—Reliance 10-J Motors, 5 H. P.
20—8-J Motors, 4 H. P.
6—New Wheel Units for Joy 6 SC Shuttle Car.
1—Goodman 660 Loader on cats, exce lent.
5—Goodman 603 Loaders on cars, latest type.
5—Joy 6BC Shuttle Cars, latest, low vein.
2—Joy 6 SC Shuttle Cars, rebuilt.
1—Joy 5 SC Shuttle Car, rebuilt.
2—Joy 32E9 Shuttle Cars.
2—2—Joy 32E10 Shuttle Cars, rebuilt
2—Joy 32E15 Shuttle Cars, rebuilt .
1—Joy 32E'6 Shuttle Car, rebuilt.
2—Joy 42E10 Shuttle Cars, rebuilt.
1—Joy T-2-S low pan Cat Truck.
2—Joy T-2-S low pan Cat Trucks with reel.
2—Joy T-1 Standard Cat Trucks, 220 AC.
1—Joy T-1 Standard Cat Trucks, 250 DC.
2—Joy 11-B Cutting Machines, like new.
1—Joy 7-B Cutting Machine, like new.
2—Joy CD-22 Drills, like new.
2—Goodman 512 Machines, with Buggusters.
1—Goodman Machine on Cats 31" high. All hydraulic.
1—Goodman 512 cutting machine, perfect.
2—Goodman 512 Cutting Machines, 220 volt AC.
1—LeaNorse low vein Machine Carrier on rubber.
2—Jeffrey 70 URB's, rubber-tired Cutters, Universal head, perfect condition.
1—Joy 11RU, rubber tired Cutters with bugdusters, Universal head and dual tires.
3—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on cats, 250 volt DC.

LOCOMOTIVES
2—Jeffrey MH-2154's, 15 tons, perfect, 42" Ga.
1—Jeffrey 13 ton, type MH-110, 36", 42" 44" Ga.
3—Jeffrey 10 ton, type MH-110, 42" and 44" Ga.
1—150 KW, 6 ph., A. C. Rotary Converter, 275 V.
12—Jeffrey, 6 ton, type MH-88, 42", 44", 48" Ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey M4 100 Locomotive Units, reasonable.
2—Jeffrey 8 ton, MH-100 2" armor plate frames.
1—Jeffrey 6 ton, type 2-88, 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42" 44" and 48" Ga.
1—G. E., 4 ton, type 825 Locomotive, 22" high.
10—G. E., 8 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G. E. 8 ton, type 822 Locomotive, 44" Ga.
3—G.E. 10 ton, type 809 Locomotive, 42", 44", 48" Ga.
1—Goodman, 4 ton, 8-30 Locomotive, 22" above rail.
2—Gordman, type 33 6 ton, 44" and 48" Ga.
3—Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse, type 908, 44" and 48" Ga.
2—Westinghouse, type 907 10 ton, 44" and 48" Ga.
3—Diesel Locomotives, 8 and 10 tons, Excellent.
Locomotive Trucks and Spare Armatures for above.

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1—5' x 14' Robins double deck Vibrator.
1—4' x 10' Robins Gyrex Vibrator.
1—McNally Pittsburgh all steel Tipple, four track, perfect.
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Belt Loading Booms
1—Robins Car Shakeout.
10—Crushers, various sizes.
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2—Jeffrey 70 URB Cutters, rubber-tired, Universal Head, low vein.
3—Jeffrey 29UC Universal Machines on Cats.
1—Joy rubber-tired 11RU cutters with bugdusters.
1—Goodman on cats, 31" overall height.
1—Baby Goodman 212, rebuilt, 250 volt DC.
1—Baby Goodman 212, rebuilt, 220 volt, 3 ph. AC.
1—Goodman 312, 18" high.
2—Goodman 512's with Buggusters, like new.
4—Goodman 512's, rebuilt or as from service.
2—Joy 11B Cutting Machines, rebuilt.
2—Goodman 512 Cutting Machines, 220 volt AC.
6—Goodman 12AA's and 112AA's.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
6—Jeffrey 35L's, like new, 17" high.
2—Jeffrey 35L's, on ow vein trucks.
15—Jeffrey 35B's and 35BB's.
2—Jeffrey 29B's on track.
2—Jeffrey 29C's track, mounted.
1—Jeffrey 29L on track, perfect.
2—Sullivan CR-10's, 15" high.

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16—Loaders, all types.
2—Jeffrey 61 CLR's on rubber, 28".
3—Jeffrey L-500 Loaders.
2—Myers Whaley No. 3 Automat Loaders.
3—Clarkson Loaders, 26" above rail.

CONVEYORS
3—Jeffrey 52-B, 36" Conveyors, 1500' each, Excellent.
4—Joy 30" Underground Belt Conveyors, 500' to 2000' each, Excellent.
1—Barber Greene 30" Belt Conveyor, 1000', Excellent.
1—Robins 30" Belt Conveyor, 1000'.
2—Jeffrey 52-B, 28" Conveyors, 1200' each.
3000' Conveyor Belt, 30".
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300 ft.
2—Joy 15" Room Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
3—Long 400 DBH 15" Chain Conveyors, 25 H. P. Motors, new.

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1—50KW G. E. TC-6 275 volt Rotary Converter.
2—100KW, G. E. TCC-6's, 275 v., Rotary Converters.
1—150KW, G.E. HCC-6, 275v., Rotary Converter.
1—150 KW, 6 ph., A. C. Rotary Converter, 275 v. DC, perfect
1—200KW, G.E. HCC-6 Rotary Converter, 275 V. DC.
3—300KW, G. E. HCC-6 Rotary Converters, 275 DC.
3—500KW West., 6ph., Rotary Convrs., 275v., D.C.
1—375 KW Westinghouse Rotary Converter, 275 v.
2—500KW West, Rotary Converters, 275 v., D.C.
1—200KW Westinghouse Rotary Converter, 275 DC.
1—200KW A. C. Rotary Converter, 6 ph., 275 DC, perfect.
(All the above with 6900/13800 and/Or 2300/4000 or many transformers).
2—150KW MG Sets, Gen. Elec. and Westinghouse.
1—200KW MG Set, Westinghouse, rebuilt.
1—200KW MG Set, General Electric, perfect.
2—150KW A. C. MG Sets, 275 DC v., excel., 220-440 AC v.
1—300KW Westinghouse, 600 volt MG Set, rebuilt.
2—300KW West., 600 v., 6 ph., Rotary Converters.
4—500KW West., 600 v., DC, 6 ph., Rotary Converters.
1—500KW HCC-6 Rotary Converter, 6ph., 600v, DC.
1—Cummins 125 KW, Diesel with 250 v, DC Gen.
1—G.M.C. Diesel Plant with 60 KW Gen., 275v. DC.
2—D-13,000 Cat. Diesel with 75 KW Gen., 275v. DC.
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Complete steam plant, will sell all or any part. Boilers, like new, 1100 H. P. 500 H. P. Also transformers, turbines, etc.
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45 Years' Dependable Service

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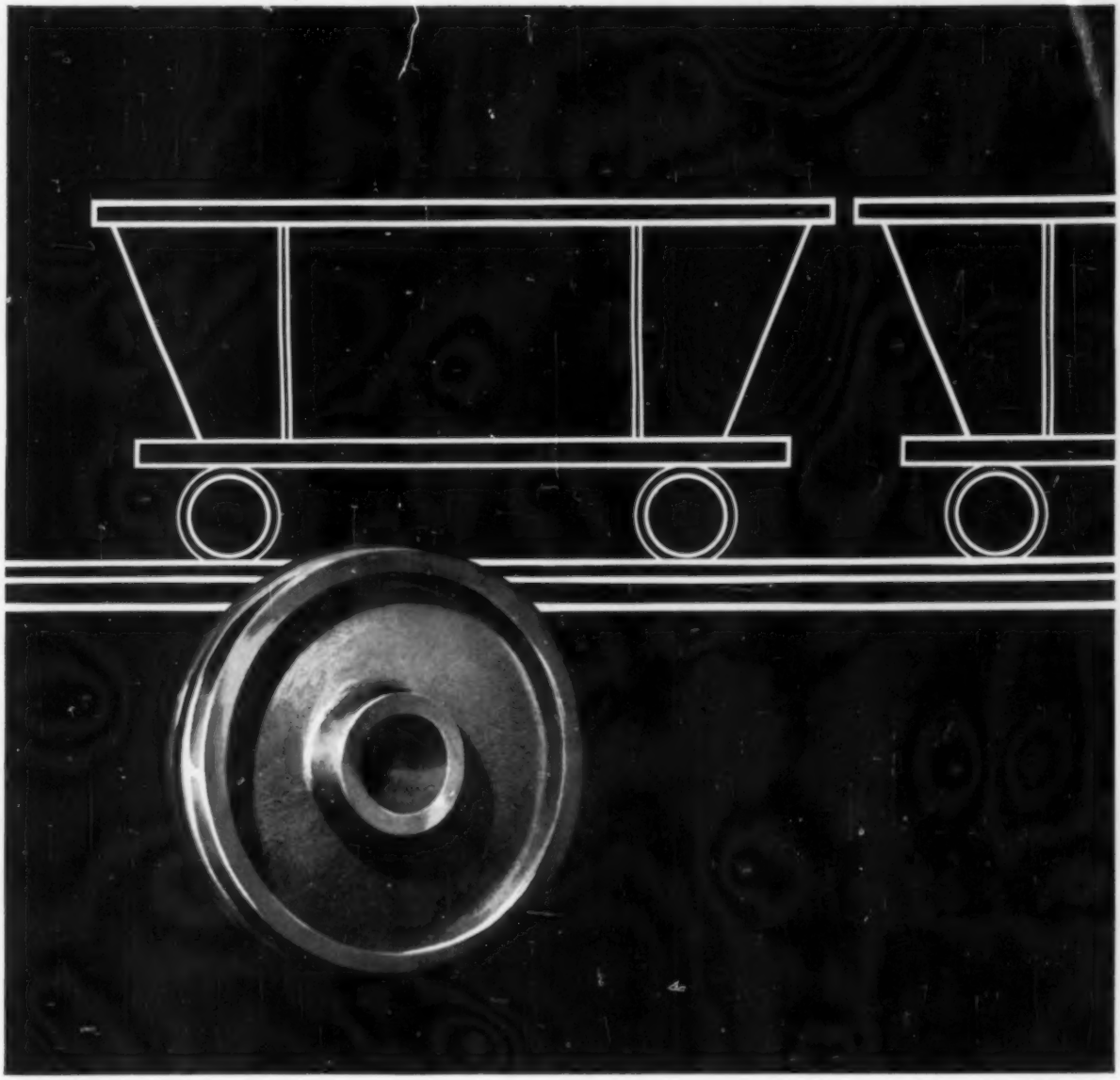

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Nakta has four characteristics essential to the best mine car wheel lubrication: *easy dispensability, extra strong adhesion, excellent moisture resistance, good structural stability.*

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Nakta is available in *six* consistency grades . . . plus a harder grade with graphite (Van Nakta 2). Find out more about Nakta from your nearest Esso Standard Oil Co. Division Office: Boston; Pelham, N. Y.; Elizabeth, N. J.; Bala-Cynwyd, Pa.; Baltimore; Richmond; Charlotte; Columbia, S. C.; Memphis; New Orleans.

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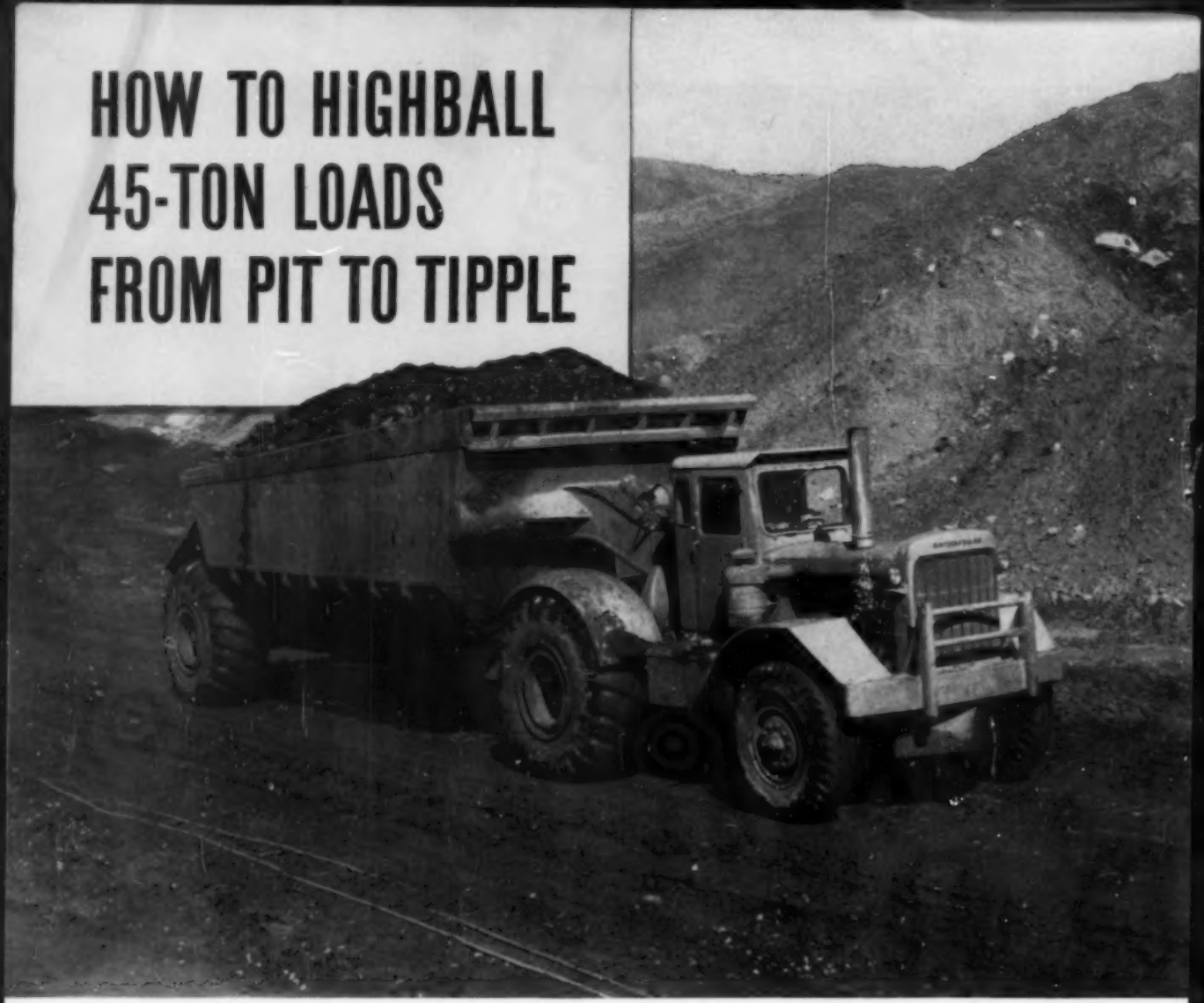
PETROLEUM PRODUCTS

HOW TO HIGHBALL 45-TON LOADS FROM PIT TO TIPPLE



Six of these CAT* DW20 Tractors are owned by United Electric Coal Co. of Canton, Illinois. Each one pulls 45 tons of coal in an Athey coal hauler, averaging 18 trips per day on a 6½-mile round-trip haul between the shovel and the tipple. That means they really roll.

You'll find it hard to beat these big, rugged rigs for fast coal hauling. The DW20 is built tough. Its 300 HP (maximum output) Cat Engine gives you the added rimpull needed to overcome grades out of the pit and rolling resistance on rough roads. Its power is matched to the capacity of the 45-ton Athey it hauls.

But the important fact is that the DW20 does *more* than just a good job. It's built to *stay* on the job, day after day, month after month. It defies the down time that hurts in cost figures. Your Caterpillar Dealer can prove to you from actual cost records that the built-in durability of the DW20 means a dollar-and-cents profit to you.

Why not ask him for a demonstration on your own job; he'll be glad to arrange it at your convenience. And he backs the long, dependable work life of every machine he sells with expert service and replacement parts you know you can trust.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

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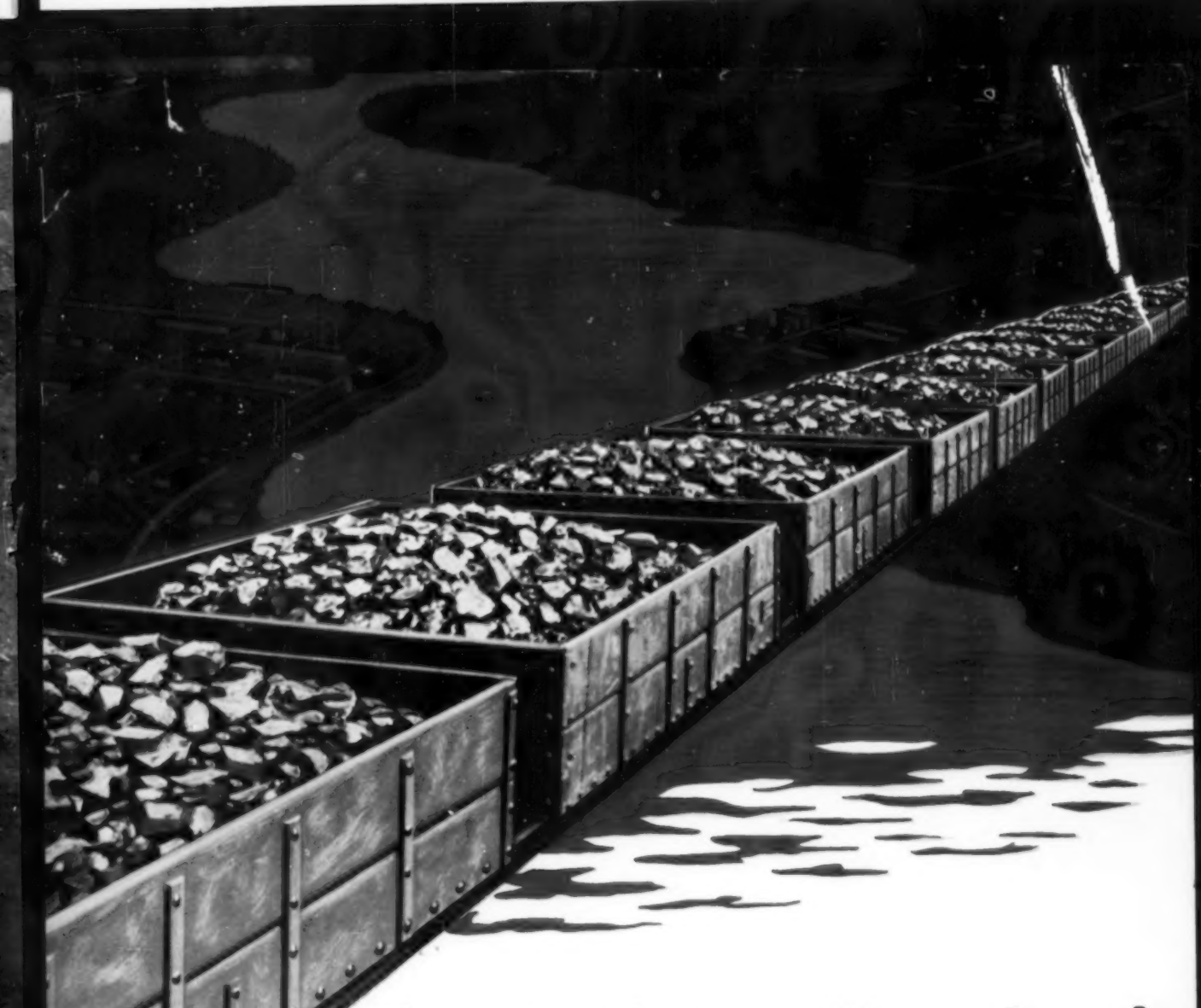
THE HARD WORK



...they just keep rolling along!

acf mine cars for non-stop production

Like Old Man River, an acf Mine Car System just keeps rolling, delivering the tonnage with never an interruption. If a car needs repairs, you just shunt it aside... and the rest of the trip keeps right on hauling.

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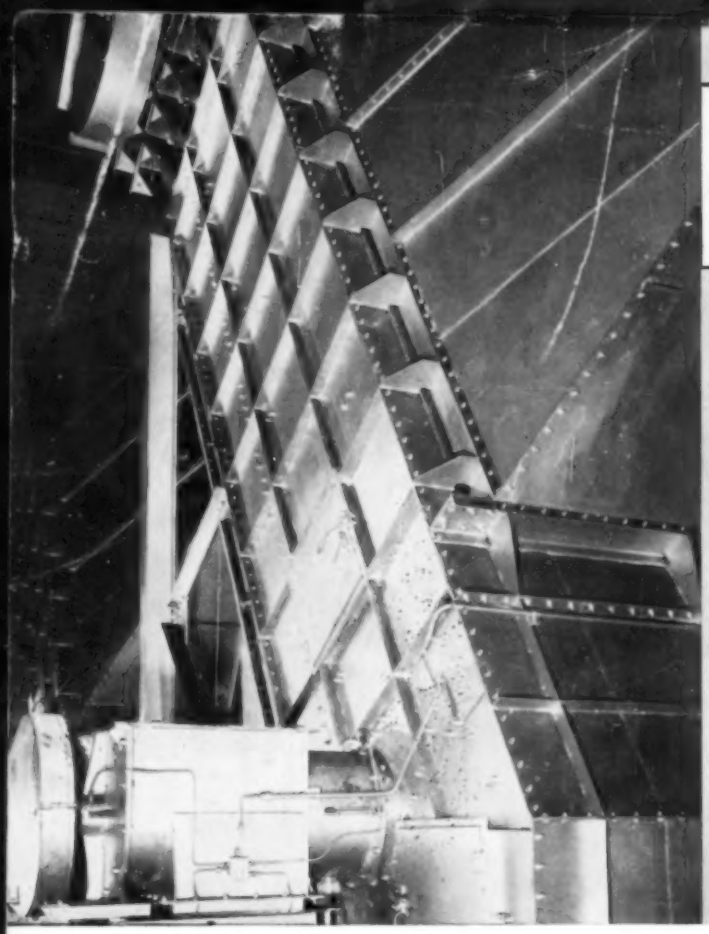
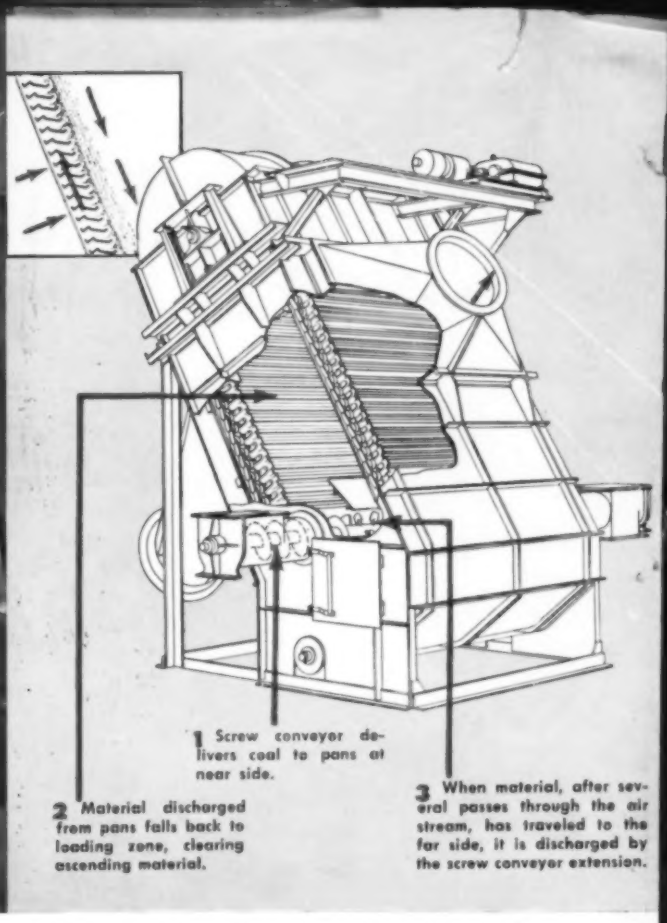
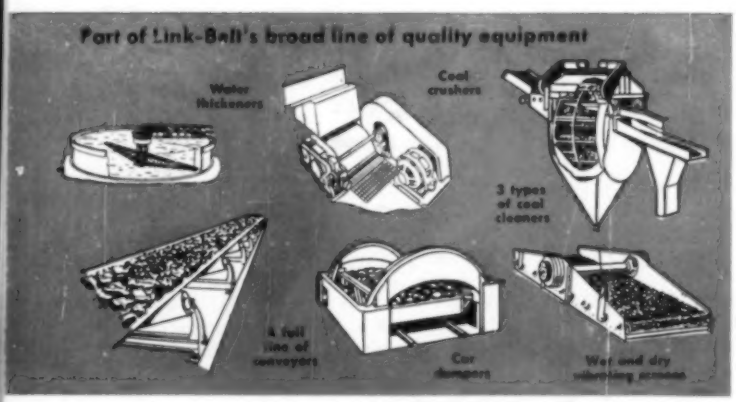
acf MINE CARS *for Constant Haulage*




1 Screw conveyor delivers coal to pans at near side.
2 Material discharged from pans falls back to loading zone, clearing ascending material.
3 When material, after several passes through the air stream, has traveled to the far side, it is discharged by the screw conveyor extension.

HERE'S HOW THE MULTI-LOUVRE WORKS—Louvre pans raise the coal and spill it out to form a constantly moving curtain, through which heated air is drawn by exhaust fans. A screw-paddle conveyor gently moves the coal to another section of the moving apron to be carried up and spilled out again. Constant agitation of shallow material bed assures thorough circulation of air and reduces power requirements to a minimum.

Why you produce more marketable coal with LINK-BELT Multi-Louvre dryers


Part of Link-Belt's broad line of quality equipment
Water thickeners
Coal crushers
3 types of coal cleaners
A full line of conveyors
Car dumpers
Wet and dry vibrating screens

Drying is uniform, gentle and safe without oxidation . . . at lower cost

If thermal drying is required in your coal preparation plant, install Link-Belt Multi-Louvre dryers and put an end to your high-moisture coal problems.

These *proved* dryers give you a more marketable coal at lower cost per ton. This is accomplished by thorough, accurate moisture reduction resulting in a uniformly high grade coal. Gentle action handles size of coal from minus 28-mesh to 1½ inches without appreciable degradation.

Oxidation is eliminated by controlled low temperatures (100 to 120 F—well below the oxidation point). High safety factor is achieved through low air velocities which reduce explosion hazards by minimizing dust in the air stream.

And these product benefits are realized at lower cost per ton. The Link-Belt Multi-Louvre dryer pays big dividends in lower maintenance costs . . . reduced power requirements . . . overall operating flexibility.

Whether it's a dryer, a conveyor or an entire plant—look to Link-Belt's complete equipment line and engineering background. For facts, call your Link-Belt office. 14.097

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